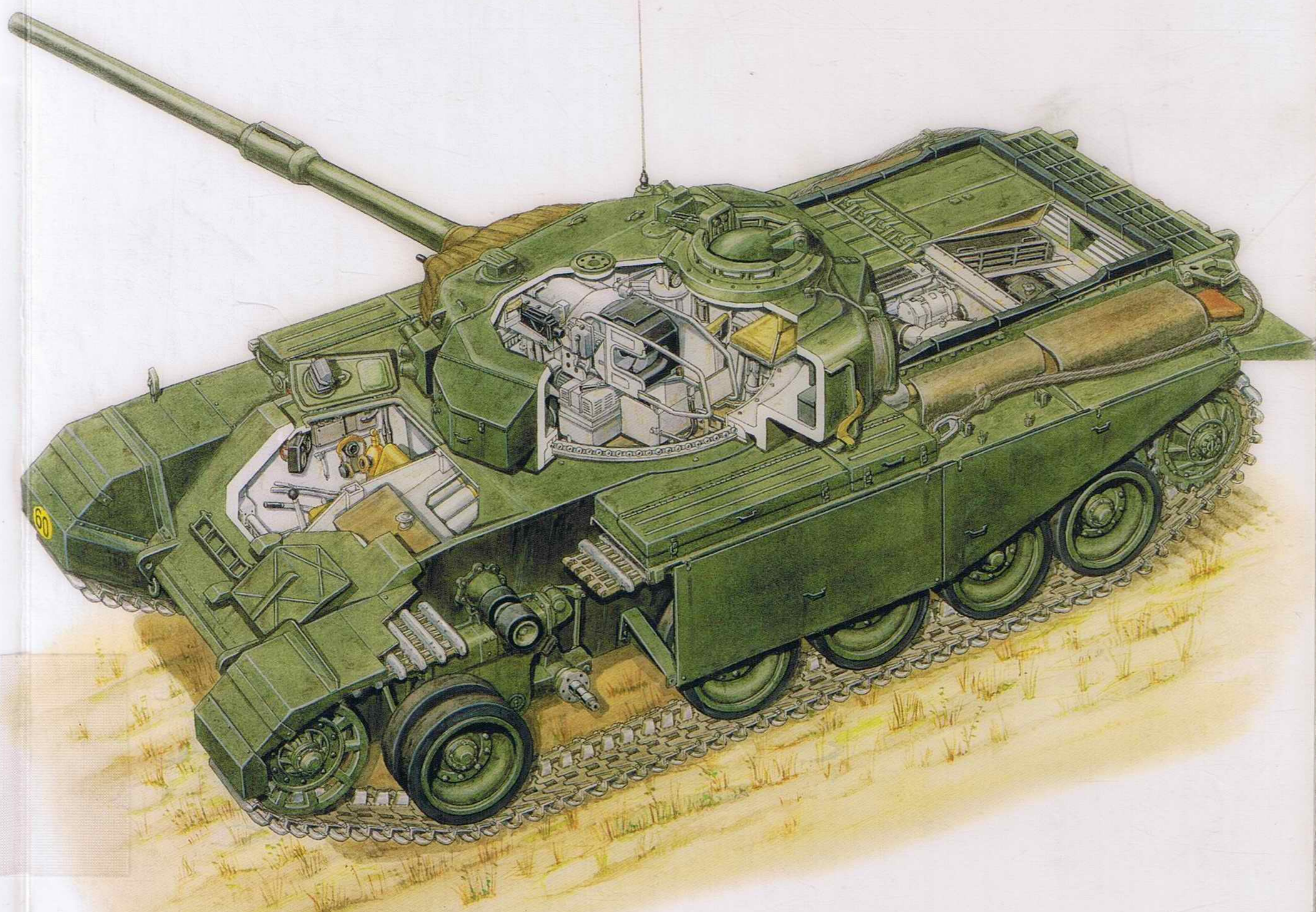


New Vanguard

OSPREY
PUBLISHING

Centurion Universal Tank 1943–2003



S Dunstan • Illustrated by M Badrocke & P Sarson



SIMON DUNSTAN is a well-established author, film maker and photographer in the field of military history, with several titles already published with Osprey. He specialises in the subject of armoured warfare, a field on which he has been writing for two decades. His books have covered topics such as helicopter and armoured warfare in Vietnam, the Challenger main battle tank, The British Guards and armoured warfare in Korea. Simon lives and works in London.

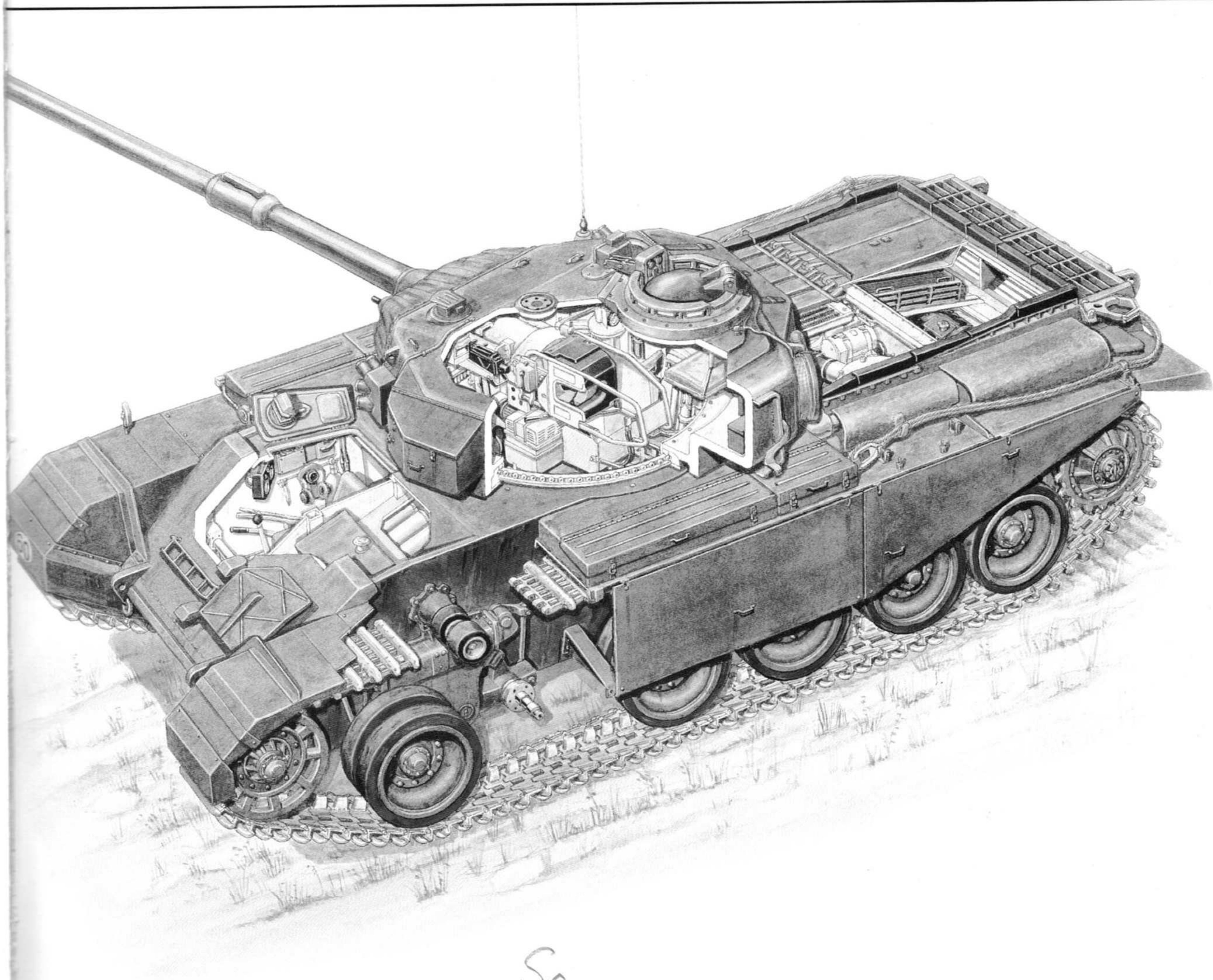
PETER SARSON has produced graphic cutaways for many armoured vehicle publications, and is regarded as one of the world's great illustrators of military vehicles. Peter lives and works in Dorset.

MIKE BADROCKE is one of Osprey's most highly respected and accomplished illustrators, notably in the field of precision 'cutaway' artwork, as exemplified in this volume. He has over the years produced quality artwork for numerous books, magazines and industry publications throughout the world, not only in the field of militaria, but also in the intricate and technically demanding sphere of aviation publishing.

CONTENTS

DESIGN AND DEVELOPMENT	3
TECHNICAL DESCRIPTION – CENTURION MARK 3	11
THE KOREAN WAR	15
CENTURION EVOLUTION	21
CENTURION SPECIAL-PURPOSE VARIANTS	34
• Centurion ARV Mark 1	
• Centurion ARV Mark 2	
• Centurion Bridgelay and ARK	
• Centurion Armoured Vehicle Royal Engineers (AVRE)	
• Centurion Mark 5 Dozer	
• Centurion Beach Armoured Recovery Vehicle (BARV)	
• Conclusion	
CENTURION UPGRADES	39
COLOUR PLATE COMMENTARY	44
INDEX	48

Centurion Universal Tank 1943–2003



S Dunstan • Illustrated by M Badrocke & P Sarson

First published in Great Britain in 2003 by Osprey Publishing,
Elms Court, Chapel Way, Botley, Oxford OX2 9LP, United Kingdom.
Email: info@ospreypublishing.com

© 2003 Osprey Publishing Ltd.

All rights reserved. Apart from any fair dealing for the purpose of private study, research, criticism or review, as permitted under the Copyright, Designs and Patents Act, 1988, no part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, electrical, chemical, mechanical, optical, photocopying, recording or otherwise, without the prior written permission of the copyright owner. Enquiries should be addressed to the Publishers.

ISBN 1 84176 387 X

Editorial: Ilios Publishing, Oxford, UK (www.iliospublishing.com)
Design: Melissa Orrom Swan
Index by Alison Worthington
Originated by Grasmere Digital Imaging, Leeds, UK
Printed in China through World Print Ltd.

03 04 05 06 07 10 9 8 7 6 5 4 3 2 1

A CIP catalogue record for this book is available from the British Library.

For a catalogue of all books published by Osprey Military and Aviation please contact:

Osprey Direct UK, P.O. Box 140, Wellingborough, Northants, NN8 2FA, UK
E-mail: info@ospreydirect.co.uk

Osprey Direct USA, c/o MBI Publishing, P.O. Box 1, 729 Prospect Ave,
Osceola, WI 54020, USA
E-mail: info@ospreydirectusa.com

www.ospreypublishing.com

Dedication

To Christopher F Foss.

Author's note

All the photographs are from the author's collection except where credited. The author wishes to extend his thanks to Christopher F Foss, David Fletcher, the IDF Spokesperson, Marsh Gelbart, the South African Defence Force and the Ministry of Defence.

Artist's note

Readers may care to note that the original paintings from which the colour plates in this book were prepared are available for private sale. All reproduction copyright whatsoever is retained by the Publishers.

For Plates A, B, C, E, F and G please contact:

Peter Sarson, 46 Robert Louis Stevenson Avenue, Westbourne,
Bournemouth, BH4 8EJ, United Kingdom

For Plate D please contact:

Mike Badrocke, 37 Prospect Road, Southborough, Tunbridge Wells,
Kent, TN4 0EN, United Kingdom

The Publishers regret that they can enter into no correspondence upon this matter.

CENTURION UNIVERSAL TANK

1943-2003

DESIGN AND DEVELOPMENT

During World War II, British tanks were severely compromised by the misguided doctrine of employing three specific types of tanks to conduct armoured operations. Small, fast, light tanks were employed for reconnaissance and scouting. A class of slow, heavily armoured 'Infantry' tanks was designed to assault enemy strongpoints and fortified positions in direct support of the advancing infantry in a manner similar to the tactics used in 1917-18 on the Western Front. A further class of faster, lightly armoured 'Cruiser' tanks was intended to exploit any success of the infantry attack through the enemy lines or around their flanks in traditional cavalry manner. Not one of these classes of tank was primarily designed to engage and destroy opposing tanks.

Following the evacuation of the British Expeditionary Force at Dunkirk in May 1940, Britain was reduced to a handful of tanks. Accordingly, Britain was compelled to continue manufacturing a range of inferior designs in order to field any tanks at all in the only theatre of operations against the Axis powers in North Africa. There a further serious defect of British tanks became apparent. Although fast and highly manoeuvrable, the Cruiser tanks proved to be chronically unreliable. Against the Italians, this did not constitute a major problem as most could be recovered after action. However, in the fast-moving battles against

British armour doctrine of the 1930s led to a series of indifferent tank designs that were often inferior to their German rivals during World War II. But after four years of bitter wartime experience, a design study begun in 1943 for a Universal Tank led to one of the best and most versatile armoured fighting vehicles ever built – the Centurion.



Rommel's Afrika Korps a significant proportion of British tanks was lost to mechanical breakdowns; often over half of those committed on an operation. As a further measure of the low esteem in which British tanks were held, the Afrika Korps invariably pressed every captured allied vehicle into service to bolster its depleted inventory, it rarely did so with British tanks apart from the heavily armoured Matilda Infantry Tank Mark II.

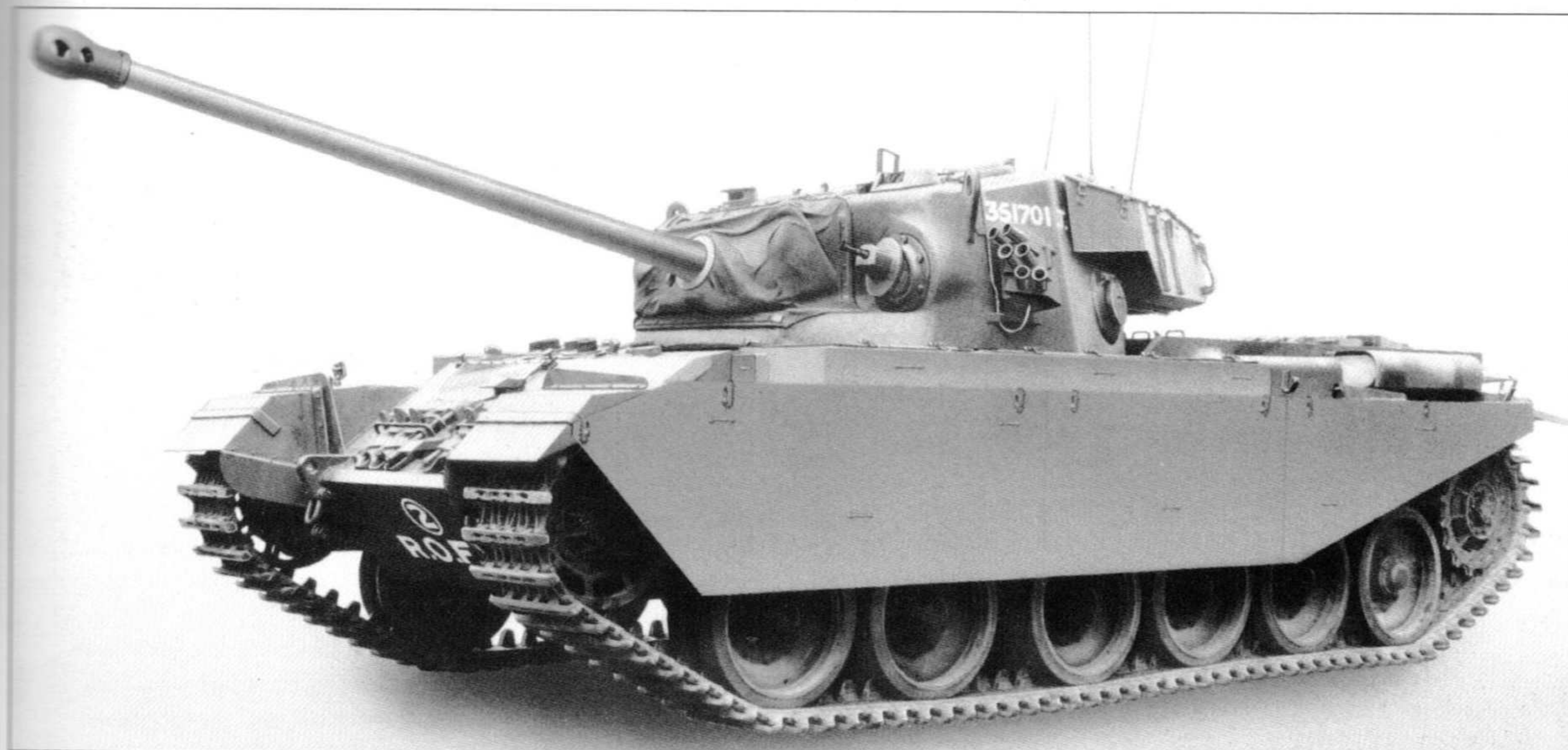


During 1942 the British 8th Army in North Africa began to receive large numbers of American tanks such as the M4 Sherman. The principal virtues of the Sherman were its mechanical reliability and effective dual-purpose 75mm main armament, capable of engaging enemy tanks on almost equal terms although the British tactical handling of armoured formations often remained deficient compared to that of the Germans. Meanwhile, the latter were introducing new and improved tank models following their gruelling experiences on the Eastern Front against the Soviet Union. In particular, the Panzerkampfwagen V, or Panther, introduced in time for the titanic battle of Kursk in July 1943, came as an unhappy surprise to the western allies as they had nothing to compare with this powerful tank that incorporated thick, well-sloped armour and a high velocity L/70 calibre 75mm main armament capable of destroying a Sherman tank at twice the combat range in any one-to-one encounter. Consequently, three or four Shermans were often lost in order to destroy one Panther or Tiger – a ratio that had an understandably harmful effect on the morale of allied tank crews.

By 1943, the British had developed a highly effective 76.2mm 17-pounder anti-tank gun with a similar performance to the 75mm of the Panther. At the time, there was no British tank design capable of mounting such a heavy weapon due to the limited size of their turrets. Numerous redundant tank hulls were modified to carry the new weapon in open-topped turrets as tank destroyers, such as the Archer and Achilles, to support armoured formations but these were of limited value during a major offensive. As an interim measure, hundreds of Shermans were fitted with the 17-pounder by mounting the weapon on its side and extending the turret at the rear. This model was known as the Sherman Firefly and represented almost one in four tanks in British units. It was a formidable combination and the Sherman Firefly became a priority target for German tank crews and anti-tank gunners during the Normandy campaign in the summer of 1944.

Despite the evidence to the contrary, the British General Staff persisted in the belief of fielding both Infantry and Cruiser tanks although the tide of user opinion favoured the concept of a single, or

The first prototypes of the A41 Heavy Cruiser Tank or Centurion featured a 20mm Polsten cannon in a separate mounting beside the 17-pounder main armament. It proved to be overly complex and intruded too far into the turret space to be practicable. The Centurion was the first British tank to incorporate a sloping glacis plate for increased armour protection.



The Centurion arrived too late to see action during World War II but six prototypes were deployed to northwest Europe in the closing weeks of the war for trials during Operation Sentry. The Centurion Mark 1 entered service with the British Army in 1946 with a Besa machine gun beside the main armament.

‘universal’, type. By the time of D-Day in June 1944, the two main types were the Churchill and Cromwell. Both were markedly inferior to their opponents, particularly in terms of firepower as they were still armed with a weapon of similar performance to that of the Sherman introduced in 1942. To redress this failure, the General Staff set out to design a tank capable of mounting the 17-pounder gun from the outset. Designated the A41 Cruiser Tank, its major characteristics were formulated by the Director of the Royal Armoured Corps (DRAC) at the 35th Meeting of the Tank Board held on 7 October 1943. The tank was to weigh 45 tons with a 650 horsepower petrol engine, well-sloped 3-inch frontal armour and it was to mount the 76.2mm 17-pounder gun as its main armament. All these features were virtually identical to the Panther, which was by now wreaking havoc among allied tank formations on the Eastern and Italian fronts while the A41 was not even on the drawing board.

	CENTURION 2	PANTHER AUSF A
Weight tons	46	45.5
Engine power	650	690-700
Range miles	50	55
Armour in mm Glacis	76 at 57°	80 at 55°
Armour in mm Turret	150	110
Main gun	76.2mm	75mm
Service date	1947	1943

On account of the previous inadequacies in the design and development of British tanks, the A41 was entrusted to the government-sponsored Department of Tank Design rather than commercial companies. The choice of the main armament established the diameter of the turret ring, which in turn determined the vehicle width. This also had to be kept within specific limits to allow the tank to negotiate Bailey bridges and be transported by rail. The need to thwart attack by German tank and anti-tank guns, including the dreaded 88mm, influenced hull

and turret armour thickness and therefore overall vehicle weight. The effectiveness of German anti-tank guns gave rise to a requirement for the A41 to mount a heavy-calibre quick-firing weapon beside the main armament. This was intended to pierce the armoured shields protecting enemy anti-tank gun crews without wasting main armament rounds. The weapon chosen was the 20mm Polsten cannon in a separate independent mounting; this was to be fired by the loader.

The engine for the A41 was the Meteor petrol engine, derived from the famous Rolls-Royce Merlin that powered both the Spitfire and Hurricane fighter/fighter-bombers and the Lancaster bomber. Derated to 650 brake horsepower, the Meteor gave an adequate power to weight ratio and the desired degree of reliability. It had been well proven in the Cromwell and Comet tanks. The Meteor was coupled to a Merritt-Brown gearbox with five forward and two reverse gears. This delivered power through a differential gear train to provide brake steering control. Again, this system had been proven on the Cromwell and Comet and gave an acceptable combination of power and flexibility for a tank of considerably greater weight. As with all petrol engines, the Meteor posed a significant fire risk and measures were taken to minimise this threat such as stowing all the main armament ammunition below the level of the turret ring. Experience had shown that the majority of knocked-out tanks were destroyed by turret penetrations where stowed ammunition caused catastrophic fires – a particular weakness of the Sherman, which resulted in the loss of many tank crews.

The A45 Universal Tank was intended to supersede the Centurion and replace the discredited Cruiser and Infantry classes of tanks with a single type. However, it never entered service except as the FV214 Conqueror Heavy Tank. This unarmoured experimental FV201 hull is fitted with a Centurion Mark 2 turret for trials purposes.



Several suspension systems were considered, as the Christie type of the previous Cruiser tank models was inadequate for a tank weighing as much as the A41. In the end, Horstmann double bogie wheel assemblies were adopted as they gave good cross-country performance and ease of maintenance. These external units were also simpler to replace after mine damage than the internal transverse torsion bar suspension systems favoured by the Germans. One innovation was the installation of an 8-horsepower Morris car engine to act as an auxiliary generator ensuring a source of electrical power for the radios, battery charging and powering the gun control equipment without having to run the main engine.

By February 1944, the opinions of frontline soldiers were sought on the configuration of the A41. Although the advantages of the 20mm Polsten for defeating anti-tank guns was realised, there were insistent demands for a forward-firing coaxial machine gun. The aiming and firing of the Polsten 20mm by the loader was considered to be a distraction from his main tasks of serving the main armament and operating the radios. Even so, it was decided to build the first prototypes with various combinations of secondary armaments, including the 20mm Polsten. A final specification for the A41 was considered and accepted at the 38th Meeting of the Tank Board held on 23 February 1944. The Tank Board recommended the production of 20 prototypes, with their manufacture being shared between the government ordnance factories at the Woolwich Arsenal and Nottingham.

On 24 May 1944, just days before the invasion of Europe, an Extraordinary Meeting of the DRAC's Advisory Committee was held at AEC Limited of Southall to view the mock-up of the A41 and the final details for the various prototypes were determined. Over the following months detailed production plans were drawn up and various manufacturers fabricated components. Due to the demands to continue producing existing tank designs to replace the high losses of the Normandy campaign, the manufacture of the A41 prototypes did not begin until January 1945. Meanwhile, the design of a new fully cast turret was under way. This gave

The first model to show the definitive layout of the Centurion was the Mark 2, revealing the fully cast turret with its distinctive stowage bins and commander's cupola with all-round observation from under armour. Although it entered service in 1947, its performance was only comparable to the Panther, which appeared in 1943, but, like all great tank designs, the Centurion had considerable potential for development and improvement to keep abreast of current technology.





greater ballistic protection as well as incorporating a conventional coaxial machine gun and a commander's cupola with all-round vision blocks. The new turret was to be fitted onto a design designated as the A41A Heavy Cruiser Tank.

In April 1945 the first A41 prototype was delivered from Woolwich Arsenal in southeast London to the Fighting Vehicles Proving Establishment at Chertsey in Surrey. By now, the A41 Heavy Cruiser was called the Centurion, although this name had originally been allocated to the A30 – a lengthened Cromwell chassis mounting a 17-pounder gun as a tank destroyer that became the Challenger. Performance trials of the Centurion began immediately and they proved to be so trouble free that it was decided to despatch some of the early prototypes to northwest Europe to prove them under active service conditions. Under the codename Operation Sentry, six Centurion prototypes arrived in Belgium soon after VE-Day for trials with the 5th Royal Inniskilling Dragoon Guards and 5th Royal Tank Regiment. The trials continued into July and user opinion of the new tank was high, though the 20mm Polsten secondary armament did not find favour and a coaxial machine gun was preferred.

The findings of Operation Sentry were considered at the 22nd Meeting of the DRAC's Advisory Committee held on 22 August 1945. As none of the criticisms were significant, a production programme for 800 Centurions was authorised including 100 A41*, or Centurion Mark 1, mounting a 17-pounder gun and a linked 7.92mm Besa machine gun. The remainder were to be the A41A model, or Centurion Mark 2, of which the first 100 were to have 17-pounder guns and later versions the 83.4mm 20-pounder gun then under development. Production of the Centurion began in November 1945 and the first models were delivered in February 1946. By October, a revised turret incorporating

A Centurion Mark 3 of 8th Royal Tank Regiment moves off during an exercise in northern England in 1949 with the commander standing upright in his Vision Cupola No 2 Mark 2. With the introduction of the 20-pounder gun as main armament and APDS (Armour Piercing Discarding Sabot) ammunition, the Centurion became a formidable battle tank throughout the 1950s.

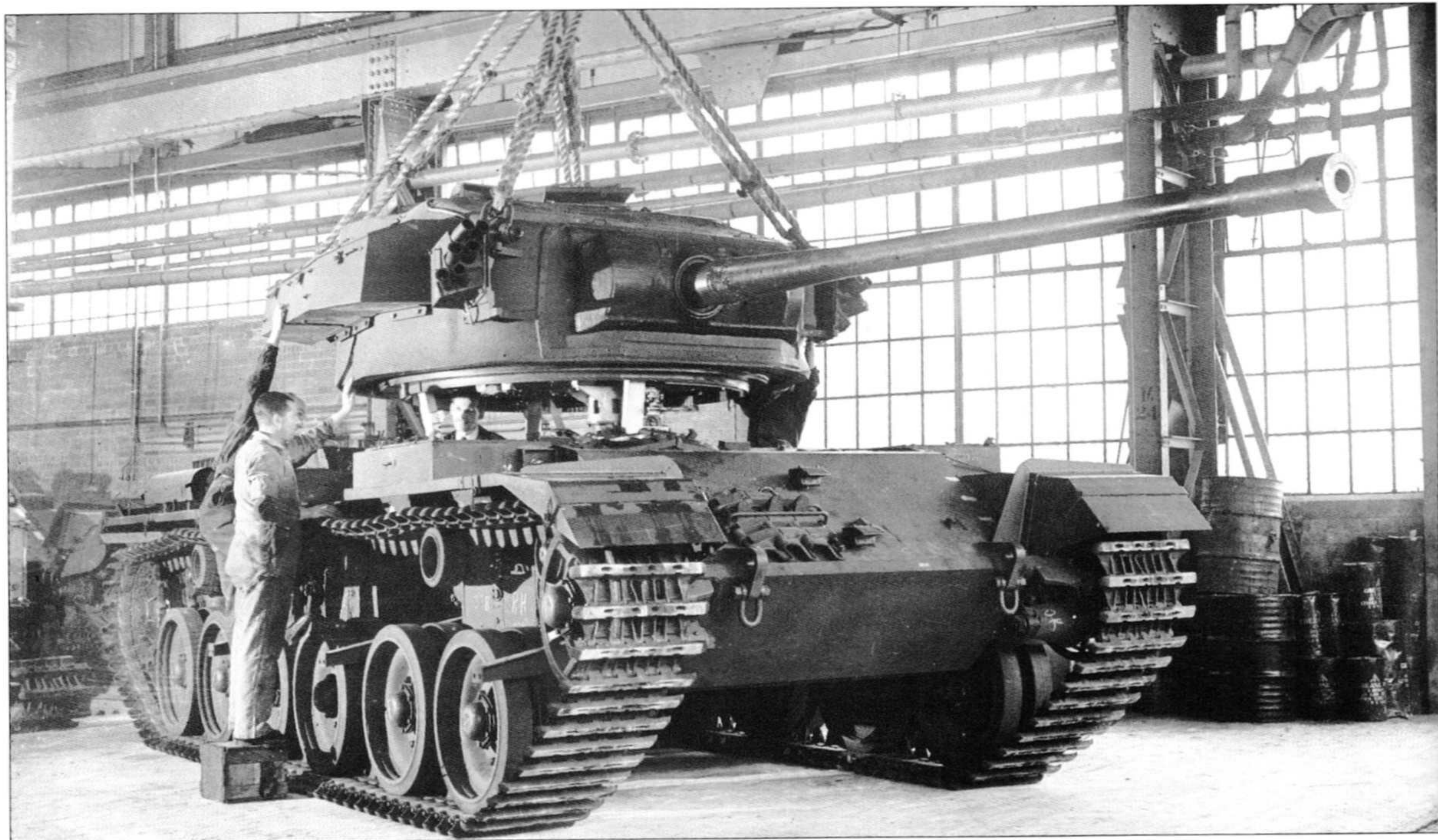


The tank commander of a mid-production Mark 3 confers with a farmer during an exercise in West Germany. As an army of occupation during the late 1940s and early 1950s, the tanks of the British Army of the Rhine were able to motor wherever they wished despite the protests of the locals. Tanks customarily carried a full load of ammunition in those dark days of the Cold War as they remained the NATO bulwark against a Warsaw Pact invasion.

the 20-pounder gun was approved and the Centurion Mark 3 became the standard model with production beginning in early 1947. By now, the earlier marks were in widespread use with the British Army but the Centurion was not intended to be in service for long.

The General Staff was now wedded to the idea of a Universal Tank to replace the discredited Infantry and Cruiser types including the Centurion, which was seen as the last in the line of the lamentable wartime Cruiser tank designs. In September 1946, the General Staff authorised the design of the A45 Universal Tank, subsequently designated the FV201. Fundamental to the design was the ability of the FV200 series to be adapted to a range of specialised variants such as flamethrowers, mine flails and amphibious assault; indeed all the roles undertaken by the special-purpose AFVs of the 79th Armoured Division during World War II. As it was thought that the Centurion could not be modified to undertake these tasks, the FV201 was to replace it. However, until such time as the FV201 entered service, production of the Centurion was to continue. The first prototype of the FV201 appeared in October 1947, but the design of several of the specialised variants proved to be difficult without major modifications to the basic hull. This compromised the Universal Tank concept to an unacceptable degree and, in October 1948, the FV201 gun tank was cancelled. The development of the family of special-purpose variants continued at a leisurely pace until it too was cancelled in 1949. After a false start using redundant Churchill hulls, a complete family of special-purpose AFVs was subsequently built around the Centurion despite the earlier reservations of the General Staff.

The huge number of Soviet tanks in service along the Iron Curtain remained a formidable threat and the appearance of the heavily armoured Josef Stalin III with its powerful 122mm main armament at the Berlin victory parade in 1945 had caused consternation among the



western allies. Neither the Americans nor the British had anything comparable and both nations identified the need for a heavy tank of similar characteristics. The Americans rapidly developed the M103 Heavy Tank mounting a 120mm gun. With the demise of the FV201, the British began the development of a new turret mounting the same 120mm gun to be fitted on a modified FV201 chassis. The resulting vehicle was designated the Heavy Gun Tank FV214 Conqueror. The first prototypes were running by early 1952. Troop trials of Conqueror began in 1955 and it entered service in 1956. Thus, the so-called Universal Tank that was intended to supersede the Centurion finally emerged as a specialised long-range tank destroyer in only limited numbers. Ironically, the performance of the L7 105mm gun that was subsequently fitted to later marks of the Centurion obviated the need for a heavy tank such as the Conqueror and it was withdrawn from service in 1966. By default, the Centurion became Britain's Universal Tank.

The effectiveness of the Heavy Tank concept was further undermined by the introduction of a revolutionary form of armour-defeating ammunition – APDS or Armour Piercing Discarding Sabot. Based on an invention by a Czech scientist who fled from the Nazis, the APDS kinetic energy projectile greatly increased the penetrating power of any round of a given calibre; thus a 20-pounder APDS round had twice the penetration capability as the fabled 88mm AP round of World War II. The APDS round was introduced with the Centurion Mark 3, which entered widespread service with the British Army in 1948. It was one of the main reasons that the Centurion was deemed to be superior to current Soviet tanks such as the JS III following combat effectiveness trials conducted in the same year. Another important factor was the superiority of the Centurion's fire control system over contemporary models. This incorporated an effective gun stabilisation system that

The Centurion Mark 3 was manufactured on two separate production lines at the Royal Ordnance Factory Barnbow in Leeds and at the Vickers Armstrong facility in Newcastle upon Tyne. The Mark 3 was built in greater numbers than any other with a total of 2,833 between 1948 and 1956.

allowed the gunner to track a target while on the move and speed up tank engagement times significantly. It was but one aspect that made the Centurion such a capable battle tank.

TECHNICAL DESCRIPTION – CENTURION MARK 3

Like most tanks of the period, the Centurion was of conventional layout. The forward part of the vehicle was divided lengthways with the driver's compartment on the right and a 20-round ammunition bin on the left, together with a 10-gallon fresh water container. The fighting compartment occupied the centre of the vehicle with the fully rotating turret housing the commander and gunner on the right of the main armament and the loader to its left. To the rear was the engine compartment containing the Meteor main and auxiliary engines, fuel tanks and air cleaners. Behind the engine compartment were the Merritt-Brown gearbox, cooling fans, radiators and steering brakes driving the rear-mounted sprockets.

Access to the driver's compartment was through two interlocking, spring-assisted hatches located in the hull top plate. The driving controls consisted of clutch, brake and accelerator arranged from left to right; a centrally mounted gear stick and steering levers on each side of the driver's seat with the handbrake positioned on the extreme right. Also to the driver's right were the instrument panel and engine controls, and to

A trio of Centurion Mark 3s display to advantage the Type A 20-pounder gun barrel with its counterweight at the muzzle and no fume extractor. These are mid-production Mark 3s with side-loading stowage bins on the trackguards and the loader's periscope on the forward face of the turret roof. On the glacis plate beside the spare tracklinks is a stowage bin for the driver's windscreen and hood for driving with the hatches open in inclement weather conditions.





his left two CO₂ fire extinguishers. The driver had two periscopes in his hatches for viewing when closed down, although his vision to the left of the vehicle was limited. Direction of travel of the tank was controlled by the two steering levers, which altered the relative speeds of the tracks. By pulling the left-hand lever, the speed of the inner track was reduced while the epicyclic trains increased the speed of the outer track causing the vehicle to turn to the left. Depending on which gear was engaged, the gearbox gave a fixed steering radius so the lower the gear, the sharper the turn. The Centurion was also capable of a neutral turn, which meant it could rotate around its own axis. This feature was very useful for manoeuvring in confined spaces. Simple mechanical linkages without hydraulic assistance activated all the controls. Although these enhanced reliability and simplified maintenance, it meant that the Centurion required a modicum of physical strength to drive and was tiring over long distances or over broken ground that required frequent gear changes.

The power-operated turret contained the main armament and auxiliary weapons and the remainder of the four-man crew. The commander was situated at the right rear of the turret with a vision cupola above his position providing all-round observation from under armour. He also had a x10 binocular periscope for precise target acquisition. Forward of the commander was the gunner's position with his gun controls to his front and right. The main armament of the Centurion Mark 3 was the Ordnance QF 20-pounder (83.4mm) Tk Mark 1 gun mounted in a rectangular mantlet together with a coaxial .303-inch (7.92mm) Besa machine gun. The 20-pounder gun was a multi-purpose weapon designed to fire high velocity armour-piercing rounds for destroying AFVs and medium velocity high explosive (HE) shells against unarmoured targets and field fortifications. It also fired canister shot as a close-range anti-personnel weapon, smoke shells and practice rounds. The Centurion was one of the first tanks with an efficient gun stabilisation system to allow it to fire on the move. In combination

With her widespread empire and reliance on Middle East oil, the British Army had worldwide commitments with an armoured division stationed in the Libyan Desert for rapid deployment to the Middle East. This Centurion Mark 3 is camouflaged in sand yellow and black stripes.

with a well-trained gunner, the Metrovick FVGCE No1 was highly effective against area targets when engaging with HE or defensive machine gun fire. It also allowed the gunner to track a pinpoint target while on the move and then stop to engage it quickly at the 'short halt' before moving off rapidly to avoid retaliatory fire.

The third crewmember in the turret was the loader-operator. He was positioned to the left of the main armament from where he loaded the 20-pounder gun and served the coaxial machine gun by feeding it with ammunition and clearing any stoppages. As if this was not enough, he also operated the two radios located in the rear turret bustle – the No 19 WT and No 38 AFV wireless sets. The No 19 set also incorporated the crew intercom for communications between crewmembers. The Centurion carried 65 rounds of 20-pounder ammunition of various types of which ten were readily accessible to the loader. Besides the coaxial 7.92mm Besa Mk 3/1 machine gun, the loader also served the 2-inch Bombthrower Mk 2 located in the turret roof beside his periscope. This weapon fired HE, White Phosphorus (WP) and illuminating flares out to a range of approximately 300 yards. It was designed to engage infantry at close quarters following the wartime experience against German Panzerfaust and Panzerschreck teams. Although an effective weapon, its breech intruded into the turret space and the loader often knocked his head against it so it was never popular. A more effective device for masking the tank was the smoke grenade discharger fitted on each side of the turret forward of the stowage bins. Each discharger had three pairs of tubes to fire WP smoke grenades out to a range of 60 yards. The resulting smokescreen allowed the tank to withdraw to cover.

The engine compartment was divided from the turret by a fireproof bulkhead. The latter incorporated the turret ventilation system, the auxiliary engine controls and a two-round ammunition bin. A Meteor Mk

One of the principal criticisms of the Centurion was its poor ease of maintenance although it was generally reliable and repairs simple once access to the faulty component was possible. For instance, it often took up to 18 hours to change an engine in the field and almost 12 in a workshop. This Centurion Mark 5 has the Type B 20-pounder gun barrel with a fume extractor to reduce the entry of toxic fumes into the turret when the breech was opened after firing.



4B 12-cylinder V-type liquid-cooled petrol engine developing 650 brake horsepower at 2,250rpm powered the tank. Although a known fire risk, the choice of a petrol engine was determined by the wartime policy to obtain the widest possible range of fuel from a given quantity of crude oil. The Royal Navy had priority for diesel; the Royal Air Force for high-octane aviation fuel while the Army was reliant on petroleum spirit. However, a petrol engine is less efficient than diesel and has a higher fuel consumption. This gave rise to the principal shortcoming of the Centurion – its inadequate range of approximately 50 miles. Across badly broken ground or in dense jungle it was even less. An auxiliary 4-cylinder Morris engine was located in the forward left-hand corner of the engine compartment. It was used to charge the batteries or provide power for the turret traverse or radio sets. It was also a vital source of power for the boiling vessel in the turret that provided the crew with a constant supply of hot water for cups of tea and heating combat rations.

Power from the main engine was transmitted through a Borg and Beck triple plate dry clutch to the transversely mounted Merritt-Brown Z51R gearbox. The transmission consisted of a combined steering and braking mechanism that drove the two sprocket assemblies mounted at the rear of the vehicle. This simple system provided maximum power at the sprockets with plenty of torque for enhanced cross-country ability. The vehicle was supported on six Horstmann suspension units with three on each side. Being externally mounted, they were simpler to replace than torsion bars following mine damage. Combined with the boat shape of the hull, this gave greater protection to the crew from the danger of anti-tank mines. The three detachable skirting plates on each side provided further protection for the suspension and hull against attack from infantry hand-held anti-tank weapons. The robust and reliable combination of the Meteor engine, Merritt-Brown gearbox and Horstmann suspension gave a top road

A Centurion Mark 3 of the 8th King's Royal Irish Hussars transports infantry of the Royal Australian Regiment across a pontoon bridge over the Imjin River in April 1951. The Centurions of the 8th Hussars proved to be a critical factor in the battle of the Imjin River when the Chinese Spring Offensive was halted by the massive firepower of the United Nations forces.



speed of around 20mph and a sustained cross-country speed of 15mph without undue discomfort to the crew.

By 1950, production of the Centurion Mark 3 was well under way at a rate of approximately four a week; a considerable number for such a complex piece of engineering by a war-ravaged British industry. The tank was manufactured at the Royal Ordnance Factory Barnbow in Leeds and at the Vickers Armstrong factory at Elswick, near Newcastle upon Tyne. The cost of a Centurion at this time was approximately £38,000 or \$100,000. Service with the British Army of the Rhine in occupied Germany had demonstrated the need for many minor improvements and almost 250 modifications were approved for the Centurion Mark 3 production programme. The major problem remained the Centurion's inadequate operational range. Frontline units in Germany tried improvising various supplementary fuel drums at the rear of the tank in a similar manner to Soviet tanks such as the T-34, but they were hardly satisfactory and prone to damage when reversing or in road accidents.

THE KOREAN WAR

Across the world in a far peninsula, the Cold War was shattered on 25 June 1950 by the communist invasion of the Republic of Korea, spearheaded by 120 T-34/85 tanks. Lacking any tanks themselves or any effective anti-tank weapons, the South Korean army crumbled in the face of the armoured onslaught across the 38th Parallel dividing Korea. Complete defeat was only averted by the prompt commitment of United States forces from Japan including M24 Chaffee light and M4 Sherman medium tanks as well as M26 Pershings of the US Marine Corps. Confined to a shrinking perimeter around the southern port of Pusan, the American and South Korean forces eventually contained the communist offensive during September. While the United Nations Organisation called on its members to respond militarily to the communist aggression, General MacArthur



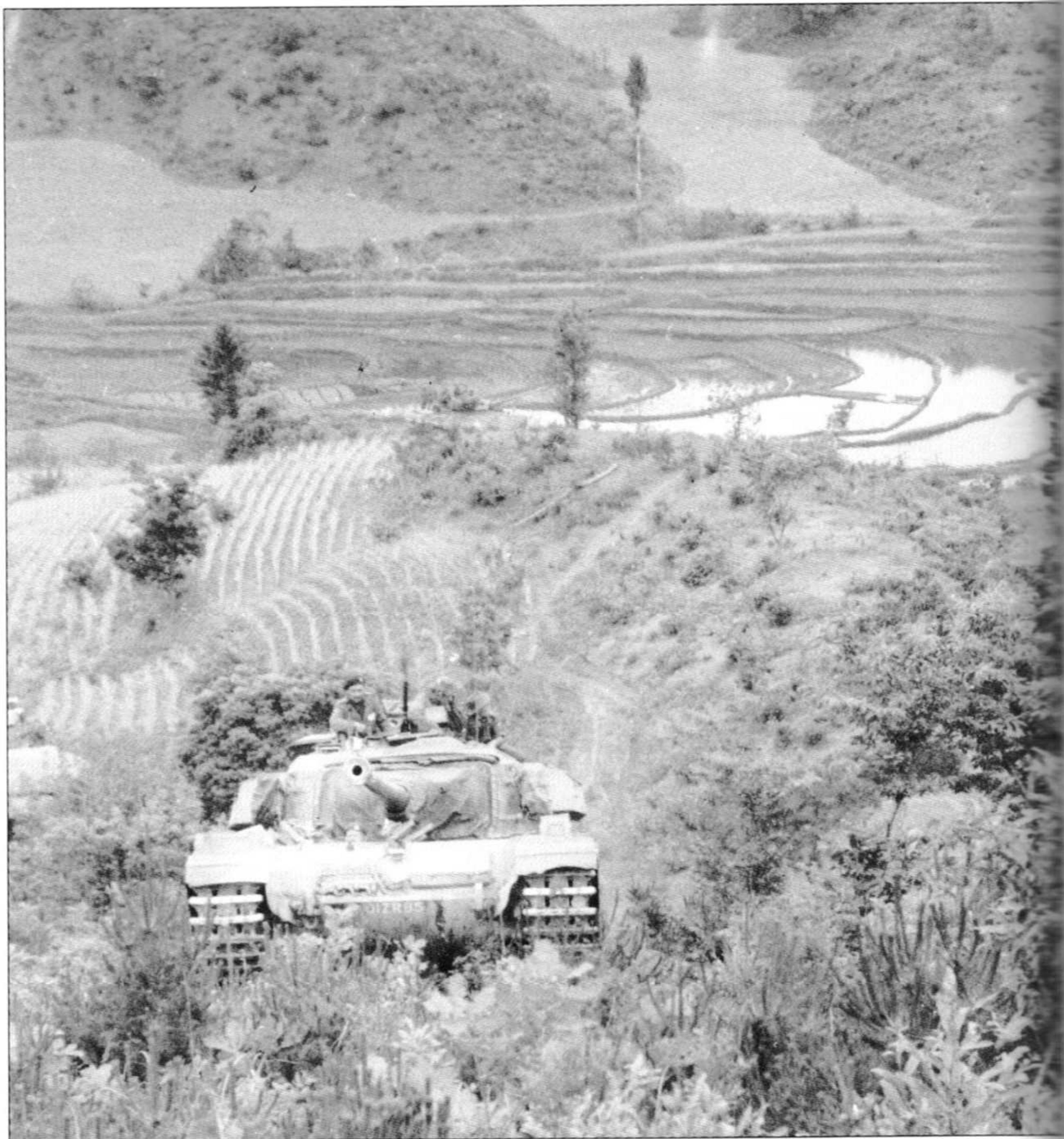
The accuracy of the Centurion 20-pounder main armament was a major asset throughout the Korean War where it provided deadly fire support to the infantry and broke up many enemy attacks with its highly effective HE round. Here, Captain Cottle of C Squadron Headquarters Troop, 8KRIH, engages targets on an enemy held hill in typical Korean terrain.

launched a brilliant counter-offensive far behind enemy lines at the port of Inchon near the South Korean capital of Seoul.

The British responded to the UN call by dispatching an infantry brigade from Hong Kong and further units from the United Kingdom. These forces included the 8th King's Royal Irish Hussars equipped with three squadrons of Centurion Mark 3 tanks and a Reconnaissance Troop of Cromwells. The tanks landed at Pusan on 14 November 1950 as armour support to the 29th British Independent Brigade. The 8th Hussars immediately moved north by train in freezing conditions and soon arrived in the North Korean capital of Pyongyang a few weeks after the Chinese Communist Forces (CCF) intervention in the

war. A disorganised headlong retreat ensued as the United Nations Forces withdrew from North Korea to form a line below the 38th Parallel. On Christmas Day 1950 the communists crossed the 38th Parallel into the Republic of Korea once more.

Throughout the bitter winter of 1950/51, the 8th Hussars learnt the rigours of operating tanks in sub-zero temperatures, far colder than anything encountered on the north German plains. At night the Centurions were parked on bundles of rice straw to prevent their steel tracks from freezing to the ground. Failure to do so would result in the total immobilisation of the tank and a burnt-out clutch as it tried to extricate itself. In such extreme temperatures towing cables and drawbars snapped; lubricants solidified; and petrol stoppages were common as water droplets in the fuel lines froze them solid. The tanks had to be started up every 30 minutes or so and each gear had to be engaged in turn to prevent the control linkages and main components from freezing. The auxiliary engine was in constant use in a forlorn attempt to heat the fighting compartment; the driver had no source of heat except his sleeping bag. Batteries cracked in the intense cold and had to be kept at a higher specific gravity to retain their charge. It was dangerous to touch the side of a tank with bare hands, as flesh would adhere to metal. Even so, the Centurions performed well in a theatre of operations for which they were never designed and mechanical problems were few. The crews suffered more from the cold than the tanks.



Despite its relatively low power-to-weight ratio of 13 horsepower per ton, the Centurion had excellent agility and was able to negotiate steep hillsides that defeated several other types of tanks in the conflict. The ability to gain the high ground and engage pinpoint targets over a wide area often proved decisive in breaking up enemy infantry attacks.

It was at the battle of the Imjin River in April 1951 that the Centurions of the 8th Hussars won lasting fame when their tanks covered the withdrawal of the 29th Brigade in heroic fashion in the face of the overwhelming Chinese spring offensive. In October, the 8th Hussars, now acting as the armoured regiment within the newly created 1st Commonwealth Division, took part in Operation Commando. This was intended to advance the United Nations northwards and deny favourable hill positions to the communists prior to the coming winter. The terrain was appalling even by Korean standards and the Centurions were severely tested. Tracks were shed as the tanks attempted to climb precipitous hills and a number of Centurions were damaged by mines or 'bogged' in the glutinous paddy-fields.

Despite these difficulties, several Centurions reached their objectives on the high features from where they dominated the surrounding terrain, pounding Chinese positions with highly accurate 20-pounder fire and supporting infantry attacks with their coaxial Besa machine guns. The Centurions' ability to scale the steep hillsides combined with the unmatched accuracy of their firepower won universal praise. In a tribute to the 8th Hussars on their departure from Korea, Major General John O'Daniel, commanding the US First Corps, said: 'In their Centurions, the 8th Hussars have evolved a new type of tank warfare. They taught us that anywhere a tank can go is tank country – even the tops of mountains.'

By the time the 5th Royal Inniskilling Dragoon Guards – the 'Skins' – relieved the Hussars in December 1951, the campaign had become static with the opposing armies entrenched on the high ground facing each



The Korean terrain was totally inhospitable to armoured operations with chains of rugged mountains interlaced with raging rivers, while any flat ground was used for the cultivation of rice. All proved extremely difficult to negotiate on foot let alone on tracks. Of all the obstacles, the glutinous rice paddies were a constant hazard for the tanks such as this bogged Centurion Mark 3 of B Squadron Headquarters Troop, 8KRIH.



other across the intervening valleys. The Centurions were dug-in among the infantry positions on the tops of hills. The tanks were protected from shellfire by sandbags and earth-filled ammunition containers. Crews lived beside their tanks in tents at first, and later, as enemy artillery fire intensified, in dugouts or 'hutchies' carved into the hillsides. There was no movement of the tanks except when squadrons were relieved or for occasional maintenance when vehicles were withdrawn below the skyline.

During the day, tank crews kept constant watch through binoculars for signs of enemy activity. Any fresh diggings, bunkers or trenches were engaged by 20-pounder HE gunfire. Within a short time the crews knew the dispositions of all enemy earthworks and the exact range to each of them. Any enemy unwise enough to show himself during daylight was liable to suffer a 20-pounder round or a volley of machine gun fire within seconds. Similarly, allied soldiers did not venture above ground for fear of communist artillery bombardment. By night, the situation was very different. Both sides patrolled aggressively in no mans land up to the opposing lines. Ambushes were set and limited raids undertaken. In all cases, the tanks acted as fire support, engaging pre-selected targets as dictated by the infantry. Prior to an infantry patrol, the tanks would register on likely trouble spots and potential ambush sites. The range, azimuth and angle of declination were established in daylight during normal harassing shoots and recorded for later reference. Each scheduled target had a codename or number and it took only seconds for a tank to execute the fire plan as indicated by an infantry patrol in no mans land.

By the end of 1951, the warfare in Korea became static with both sides entrenched on opposing hilltops with a constant war of artillery duels, ambushes and fighting patrols. The tanks were dug-in atop the commanding heights with wide fields of fire. From these vantage points, the tanks dominated no mans land and curtailed all enemy movement during daylight. This Centurion Mark 3 of the 5th Royal Inniskilling Dragoon Guards is masked by a camouflage net to allow the crew to enter and leave the tank without being observed by enemy snipers.

A pair of Centurion Mark 5s of B Squadron, 6 RTR, patrols the streets of Port Said after the ceasefire following the Anglo-French invasion to restore control of the Suez Canal in November 1956. B Squadron was involved in fierce fighting in support of Nos 42 and 45 Royal Marine Commandos during the initial assault. The black stripe around the turret was a mutual recognition device for British and French tanks while the large white 'H' on the turret roof was visible to allied aircraft – the 'H' stood for 'Hamilcar' the original codename for the invasion, which was actually called Operation Musketeer.



Against massed enemy infantry attacks, which invariably occurred at night, the supporting fire of the tanks was an important addition to the divisional artillery. Several Centurions were fitted with American searchlights above the main armament in order to illuminate enemy patrols in no mans land. Tanks normally operated in pairs with one to bathe the suspected area in light while the other engaged the target with HE. The searchlights were vulnerable to small arms fire and artillery fragments and required the main engine to be run at high revs to produce sufficient electrical power.

The 'Skins' conducted a number of limited armoured raids during 1952. Although these were generally successful, the unfavourable terrain and risk of losing tanks to bogging and mines, which could result in costly and protracted recovery operations, cast doubt on their value and they were discontinued. The Chinese held no doubts as to the effectiveness of the Centurions and attempted to force their withdrawal from the hilltops. For five days in May 1952, a concerted firestorm of artillery rounds fell on the tanks. The Centurions received 45 direct hits during that time. None of the crews, secure inside the tanks, were injured and

The Centurion enjoyed considerable export sales during the 1950s with the majority being Marks 3 and 5. This Mark 5 belongs to the Royal Danish Army and has been modified with the addition of a .50-inch calibre Browning machine gun at the commander's cupola.



little damage was incurred beyond smashed periscopes, radio aerials, bazooka plates and stowage bins. Two tanks had to be evacuated but were quickly replaced. The enemy did not succeed in his objective, but such was the discomfort of the surrounding infantry under the heavy shellfire that some tanks were withdrawn below the skyline by day and only moved up to their fire positions at night. Other Centurions were covered by massive over-head field fortifications of railway sleepers and sandbags, known as 'elephant houses', which protected the tanks against mortar and medium artillery rounds.



In December 1952, 1st Royal Tank Regiment relieved the 'Skins'. 1RTR continued the task of harassing the enemy and dominating no mans land. At night, the Centurions fired pre-registered Defensive Fire, or DF plans, to the front of infantry positions to counter enemy attacks and in support of friendly patrols. Infantry raids to capture prisoners and destroy field fortifications were also supported by tank fire. As peace negotiations continued into the summer of 1953, the Chinese mounted a fierce attack against a British hilltop position called The Hook in May. This position was held by the 1st Battalion Duke of Wellington's Regiment with C Squadron 1RTR in support. Throughout the night action, the Centurions engaged the swarming enemy and inflicted heavy losses, firing 504 rounds of 20-pounder HE and 22,500 rounds of Besa ammunition.

On the occasion of the coronation of Her Majesty Queen Elizabeth II in June, the guns of the divisional artillery fired a *feu de joie* of red, white and blue smoke shells onto Chinese positions. As the smoke began to clear, all the Centurions in the frontline fired one 20-pounder round in a crashing salvo at a pre-selected target. In the following month, C Squadron supported the US 1st Marine Division to the left of The Hook as the Chinese recklessly sacrificed hundreds of soldiers in a final, futile attempt to capture the position. On 27 July 1953 a truce was signed at Panmunjon and hostilities ceased. The Centurion had proved itself in combat in no uncertain terms among the rugged hills of Korea, where its remarkable agility and fearsome firepower had often proved invaluable in the support of the embattled infantry. In particular, the accuracy of the Centurion's main armament was decisive. In the words of Trooper Donellan of the 1st Royal Tank Regiment: 'We could hit any spot within a mile and a half in front of us, whether it was a range of mountains or a pheasant. If an army patrol heard movement or anything, they would radio a grid reference and we could put a shell down in a barrel of beer if they wanted it. That's how good the tanks were.'

The Mark 7 represented a comprehensive redesign of the Centurion with an enlarged hull to accommodate a greater fuel capacity under armour and improve the tank's poor range. The vehicle incorporated numerous other detail changes and 755 were built between 1954 and 1959.

In 1959, the L7 105mm gun was introduced and it was retrospectively fitted to all models of Centurion from the Mark 3 onwards. The Centurion and L7 proved to be a formidable combination and the 105mm rifled gun became the standard tank main armament throughout NATO except for the French. Here, the crew clean the barrel of the L7 105mm gun of their Centurion Mark 6/1. This Centurion was originally a Mark 3 and was subsequently up-gunned and up-armoured with an appliqué patch on the glacis plate.



CENTURION EVOLUTION

The Centurion Mark 10 of 4 Troop, C Squadron, 16th/5th The Queen's Royal Lancers, engage rebels of the Quteibi tribe during Operation Armadillo's Delight in the Wadi Misrah during the Radfan campaign in May 1964 – the first time that British tanks had fired in anger since the Korean War.

Although the Centurion had proved to be the outstanding tank of the Korean War, battle experience prompted several improvements and modifications, such as the removal of the loader's 2-inch Bombthrower and the relocation of his roof-mounted periscope. The most important change was the substitution of the 7.62mm Browning for the 7.92mm Besa as a coaxial machine gun. Not only was the Browning more reliable than the Besa but also 7.62mm was now chosen as the NATO standard calibre for small arms ammunition. With this modification,



the Centurion became the Mark 5 and it first appeared in 1955 with new-build production models in 1956. Other major modifications around this time included the fitting of a fume extractor to the 20-pounder gun and the introduction of a mono-wheel fuel trailer to be towed behind Centurion in order to improve the tank's inadequate operational range.

The 200-gallon armoured fuel trailer was not a success in service due to its excessive length, which caused problems when reversing or negotiating difficult terrain. Tank crews cordially loathed it. At the same time, a comprehensive redesign of the Centurion hull was under way to introduce a new model with a greater fuel capacity. Together with many other improvements, this became the Centurion Mark 7 and production began in 1954. One of the main differences was the use of UNF or unified screw threads and tools to conform to American National as a standardised screw thread. This followed a NATO requirement for greater 'interoperability' among the armies of the western alliance.

The performance of the Centurion during the Korean War had impressed the US Army and this led to the purchase of many Centurions by the US government to equip the armoured units of European NATO armies under the Mutual Defense Assistance Program. Indeed, the United States bought the greatest number of new Centurions after the British Army. Other major purchasers of Centurions during the early 1950s were Australia, Canada, India, South Africa, Sweden and Switzerland with minor users being Egypt, Iraq, Jordan, Kuwait, and New Zealand. In all, 4,423 Centurions were produced between 1946 and 1962. Among this list is one notable exception – Israel.

Over the years, the Israeli Defence Force (IDF) has been the largest user of the Centurion after the British Army. Almost a quarter of all the Centurions produced were acquired by the IDF and it remains in service as a heavily armoured engineer combat vehicle into the 21st century over 40 years after the Centurion was first procured by Israel in December 1958. At first, the Centurion was unpopular in the Israeli Armoured Corps as it was much heavier and more complicated than the previous models they had used, such as the Sherman and the French AMX-13 light tank. During exercises in the Negev desert, the

The Centurion ARV Mark 2 was a highly effective recovery vehicle and it served with the British Army from the Suez campaign of 1956 to the Gulf War of 1991.



After years of operating simpler tanks of World War II vintage such as the Sherman, the Centurion presented several problems to the Israeli Armoured Corps because of its complexity, particularly when operating in the dusty conditions of the Negev desert. (IDF)



early Centurions suffered numerous mechanical breakdowns and the tank gained an unenviable reputation for chronic unreliability. Inefficient maintenance and poor training caused many of the problems.

It was not until General Israel Tal became the commander of the armoured corps on 1 November 1964 that the Centurion was to vindicate itself. General Tal, a man of wide technical expertise and the strength of character to instil the discipline essential to the command of armoured formations and modern weapon systems, rigorously instituted strict maintenance procedures and gunnery training. Confidence in the Centurion rose dramatically. It soon proved its worth during the continuing battles along the Syrian border when the Centurion engaged and destroyed Syrian tanks and engineering vehicles at extremely long ranges thanks to the crews' new-found expertise in tank gunnery. It was soon to be put to dramatic effect during the Six Day War of June 1967.

At the outbreak of the conflict, the IDF had approximately 400 Centurions and they formed the spearhead of the three Israeli divisions in the overwhelming offensive that captured the entire Sinai Peninsula. After the ferocious and hard-fought breakthrough in the Gaza Strip against a tenacious Egyptian defence, the Centurions and M48 Pattons thrust onwards towards the Suez Canal. In the fluid battles that ensued, the Centurions' mobility and firepower proved to be second to none, while their ability to continue fighting after extensive battle damage made the Centurion highly regarded by their crews.

One of the decisive elements in the success of the Israeli armoured corps was the outstanding performance of the L7 105mm main armament of the Centurion. The design of this weapon began at the Armament Research and Development Establishment at Fort Halstead, Kent, during the early 1950s and the first trials were conducted in July 1956. During the Hungarian uprising in November 1956, the defence staff at the British embassy in Budapest was briefly able to inspect a Soviet T-54 captured by Hungarian patriots. This information dictated the performance requirements for the new weapon. The L7 105mm

exceeded these with ease and it subsequently became the standard tank gun within NATO. Most armies around the world that were equipped with western tanks also adopted this superb weapon.

User trials of the L7 105mm gun were conducted in July 1959 and a single Centurion was built in the same year incorporating the gun on an up-armoured Mark 7 hull. This vehicle was produced to prove the viability of the L7 gun and a proposed up-armouring programme for the Centurion fleet. As early as November 1956, trials were conducted of a Centurion Mark 8 fitted with an additional 2 inches, or 50mm, of armour welded to the glacis plate. Both the up-gunning and up-armouring programmes of the Centurion fleet were undertaken during base overhaul from 1959 onwards. These modifications altered the basic mark numbers, with the Mark 5 becoming the Mark 6, and Marks 7 and 8 becoming Marks 9 and 10 respectively. New-build vehicles had these features incorporated during production.

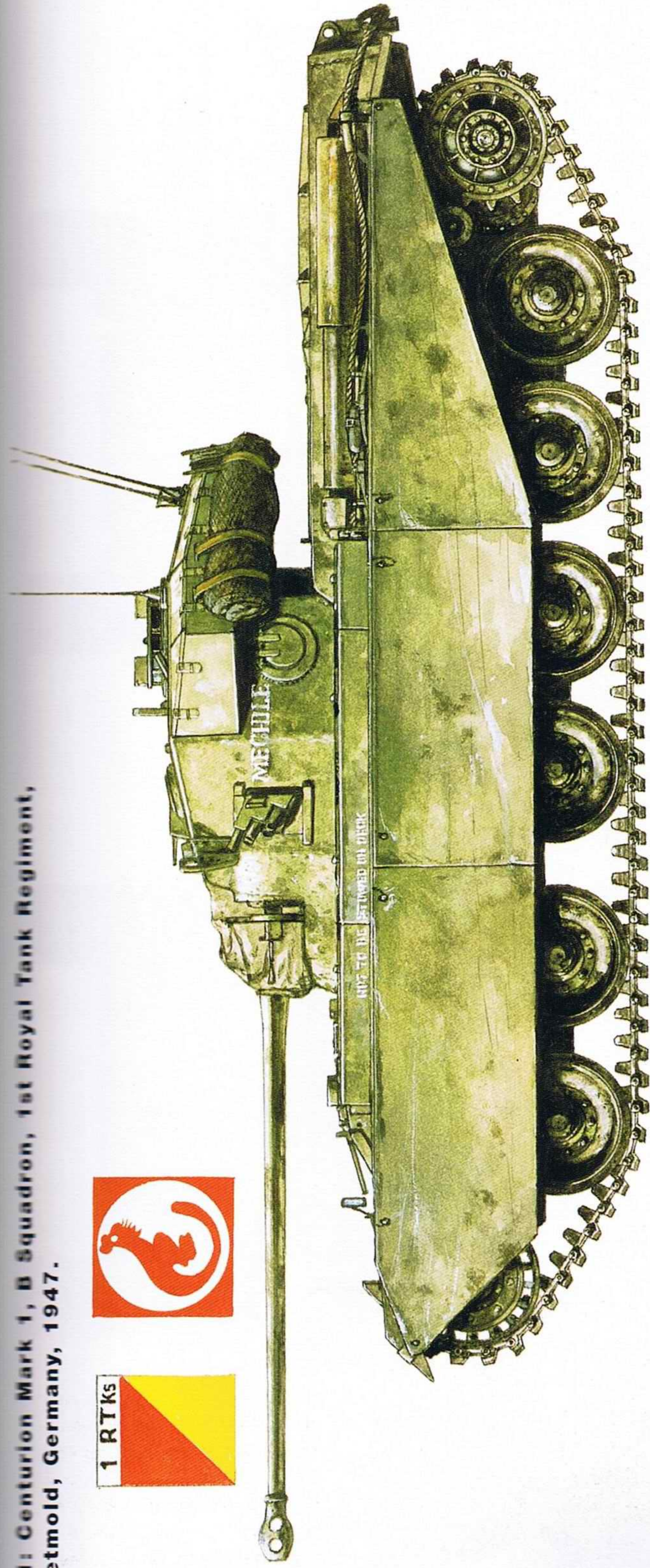
The next major modification programme was the introduction of infrared night driving and fighting equipment. A 22-inch searchlight mounted above the mantlet and aligned with the main armament provided infrared illumination for the gunner and commander. Depending on weather conditions, the system was effective in the active mode out to a range of approximately 500 yards. The main limitation was that any tank using IR apparatus in the active mode was readily visible to an enemy similarly equipped. Installation of IR equipment began in 1965 and this modification altered the vehicle designation with the suffix /1; thus a Centurion Mark 10 became 10/1. This applied to earlier marks as well.

The final modification programme of significance was the installation of the 0.5-inch calibre ranging gun from 1966. The ranging gun system offered a simple and accurate method of range finding as

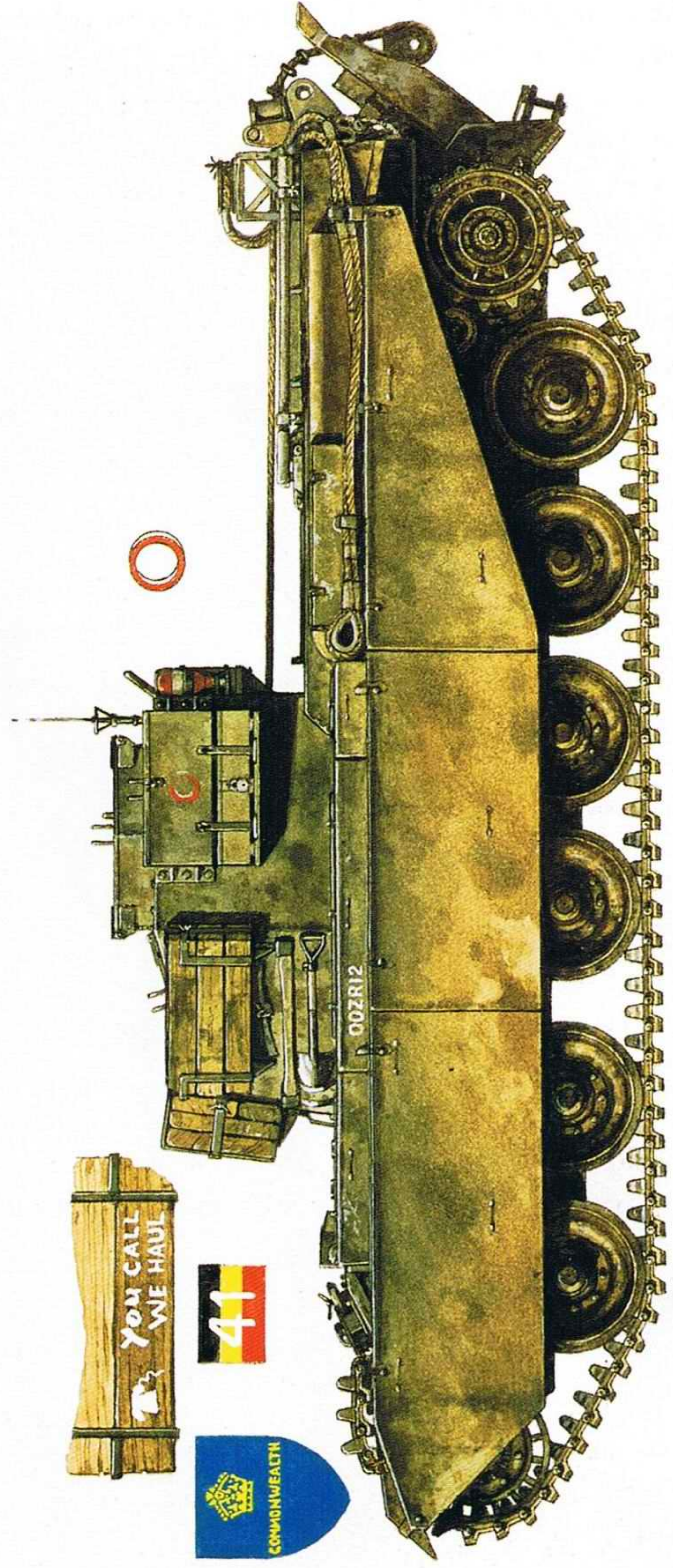


A Centurion ARK deploys its ramps to form a 75-foot-long bridge across a wide anti-tank bridge. By acting as a central pier in this way, the ARK also forms a means for tanks to negotiate obstacles such as steep-sided earth banks or sea walls.

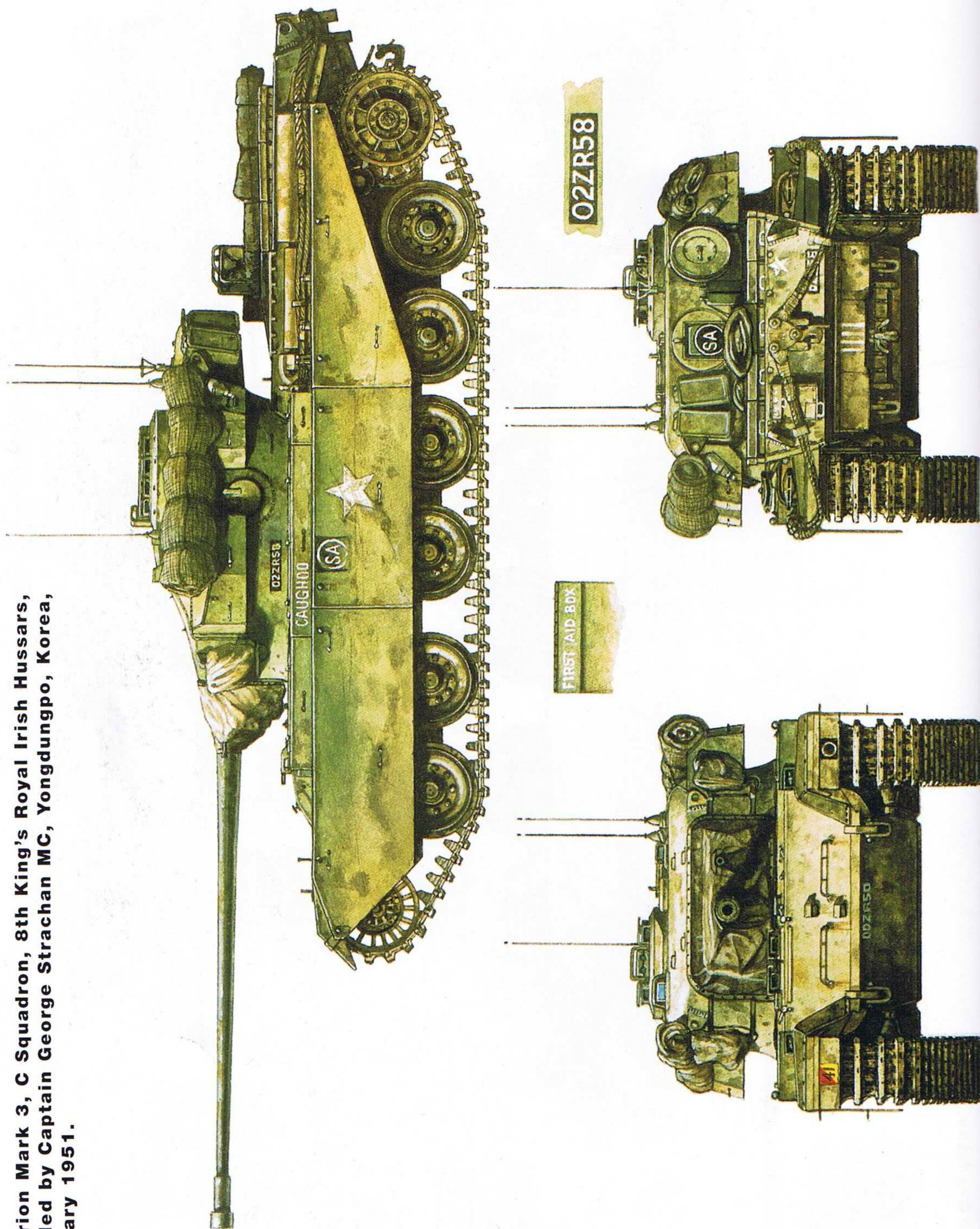
A1: Centurion Mark 1, B Squadron, 1st Royal Tank Regiment, Detmold, Germany, 1947.



A2: Centurion ARV Mark 1, C Squadron, 1st Royal Tank Regiment, commanded by Sergeant T. George RNZAC, Gloster Valley, Korea, 1953.

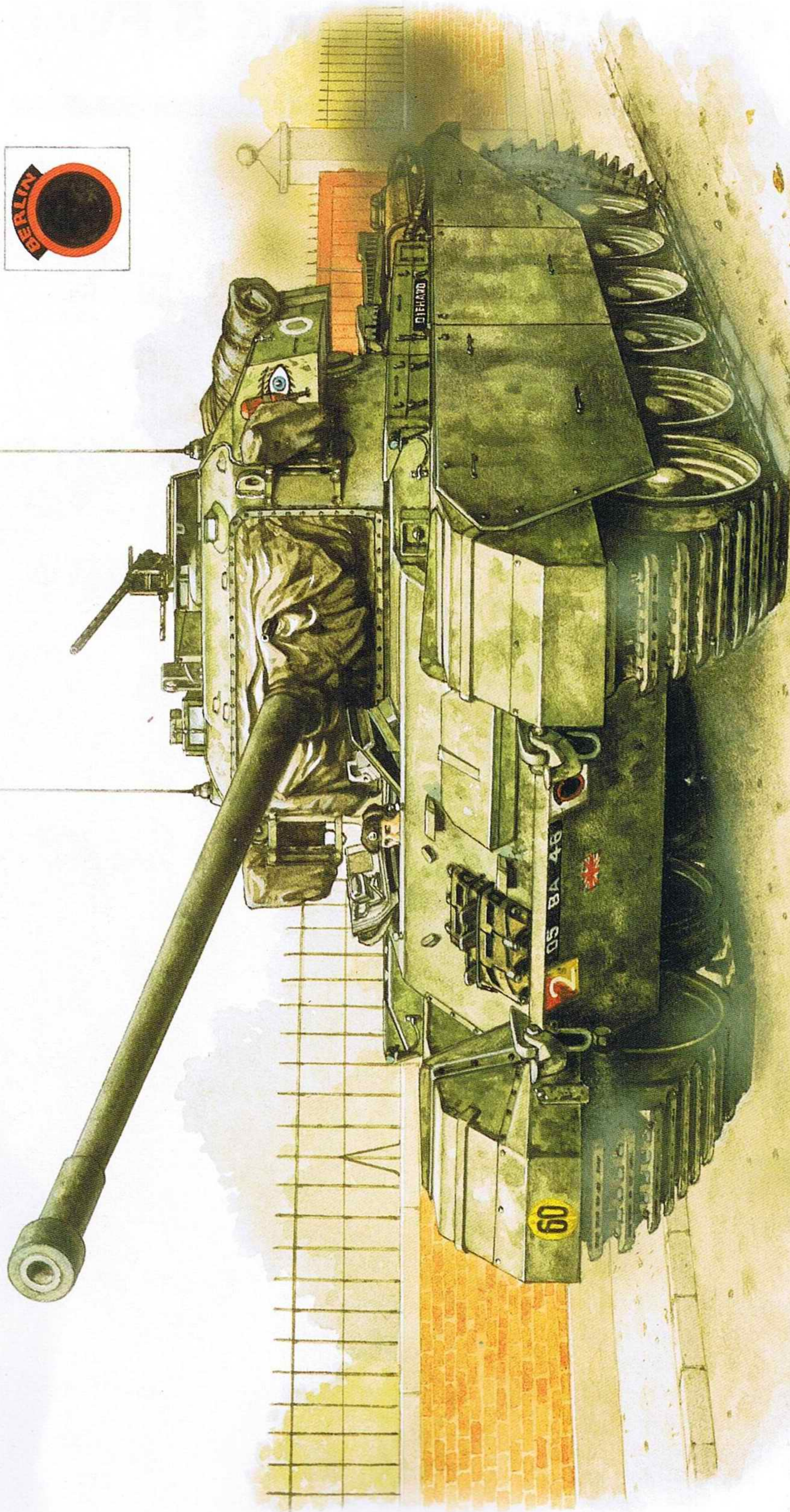


B: Centurion Mark 3, C Squadron, 8th King's Royal Irish Hussars, commanded by Captain George Strachan MC, Yongdungpo, Korea, 11 February 1951.



C: Centurion Mark 5 of 10 Troop, C Squadron,
4th Royal Tank Regiment, commanded by
Sgt. 'Jake' Jacobs, West Berlin, 22 August 1961.

DIEHARD



D: CENTURION MARK 5 FV4001

SPECIFICATION

Crew: 4 (Commander, Gunner, Loader/Operator, Driver)

Weight: 49 tons

Length: Hull – 24 feet 9 ½ ins
Gun forward – 32 feet 3 ins

Width: 11 feet 0 ¾ ins

Track width: 2 feet 0 ins

Ground pressure: 12.8 pounds per sq.in.

Ground clearance: 1 foot 8 ins

Vertical obstacle climbing: 3 feet

Engine: Rolls-Royce Meteor Mark 4B

Transmission: Merritt-Brown Z51R

Fuel capacity: 121 gallons petrol

Max. speed: 21mph

Range: 32 miles

Main armament: Ordnance QF
20-pounder (83.4mm) Tk Mark 1

Secondary armament: 7.62mm Browning

Rounds of ammunition: 65 20-pounder;
3,600 7.92mm

KEY

1 Driving mirror

2 Vehicle horn

3 Sidelight

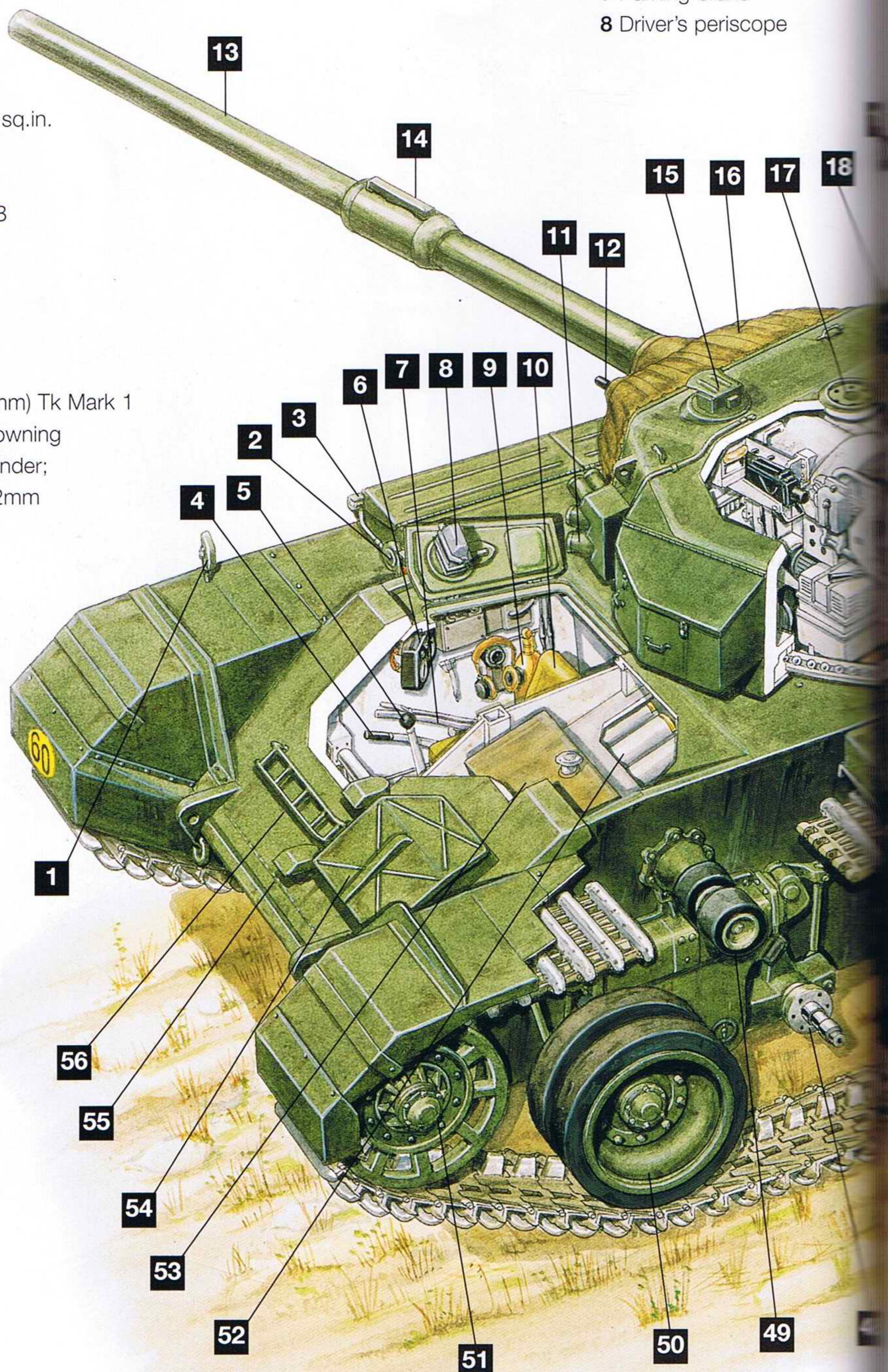
4 Steering lever

5 Gearstick

6 Instrument panel

7 Parking brake

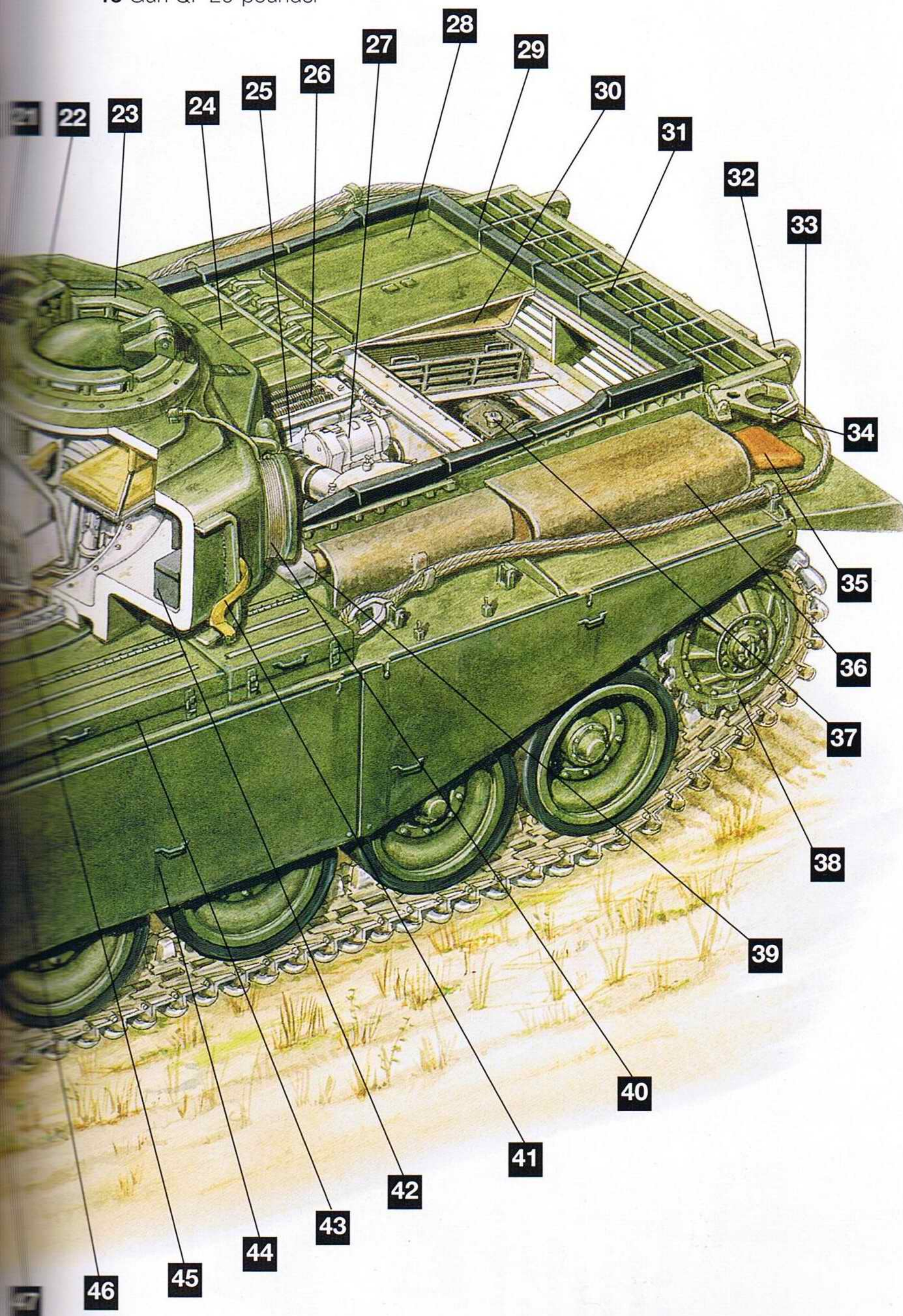
8 Driver's periscope



- 9 Fire extinguisher
- 10 Driver's seat
- 11 Smoke grenade dischargers
- 12 Coaxial machine gun
- 13 Gun QF 20-pounder

- 14 Fume extractor
- 15 Loader's periscope
- 16 Canvas mantlet cover

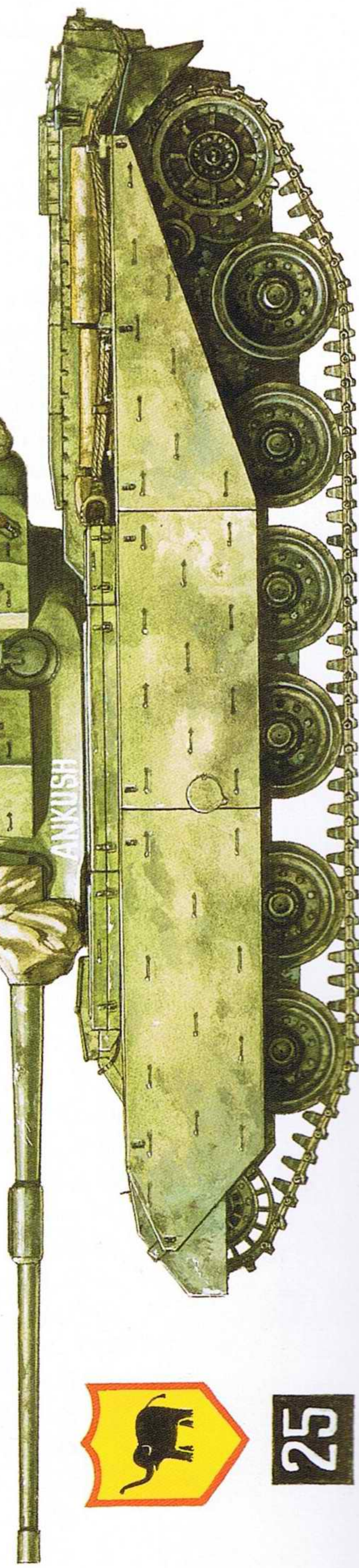
- 17 Ventilator
- 18 Gun control equipment
- 19 Radio aerial
- 20 Gunner's periscope
- 21 Commander's blade vane sight
- 22 Commander's periscope
- 23 Commander's vision cupola
- 24 Engine compartment covers
- 25 Meteor Mark 4B 650hp engine
- 26 Oil cooler
- 27 Main engine generator
- 28 Transmission compartment covers
- 29 Gun depression stop-rails
- 30 Radiator
- 31 Cooling air outlet louvres
- 32 Towing hook
- 33 Towing cable
- 34 Gun clamp
- 35 Exhaust outlet
- 36 Exhaust silencer
- 37 Gearbox
- 38 Drive sprocket
- 39 Exhaust pipe
- 40 Remote telephone cable reel
- 41 Water jerrycan holder
- 42 Spare periscope blocks
- 43 Top-loading stowage bins
- 44 Bazooka plate lifting handle and staple for camouflage foliage
- 45 Spent cartridge case bin
- 46 Turret race
- 47 Bazooka plate attachment arm
- 48 Suspension unit axle arm
- 49 Track guide roller
- 50 Roadwheel
- 51 Track adjuster assembly
- 52 20-pounder ammunition stowage rack
- 53 Drinking water container
- 54 Driver's approach march hood container
- 55 Driving headlamp
- 56 Spare track link holder



E1: Centurion Mark 7 of Maj. Gen. Rajinder Singh, GOC Indian 1st Armoured Division, North Punjab, September 1965.

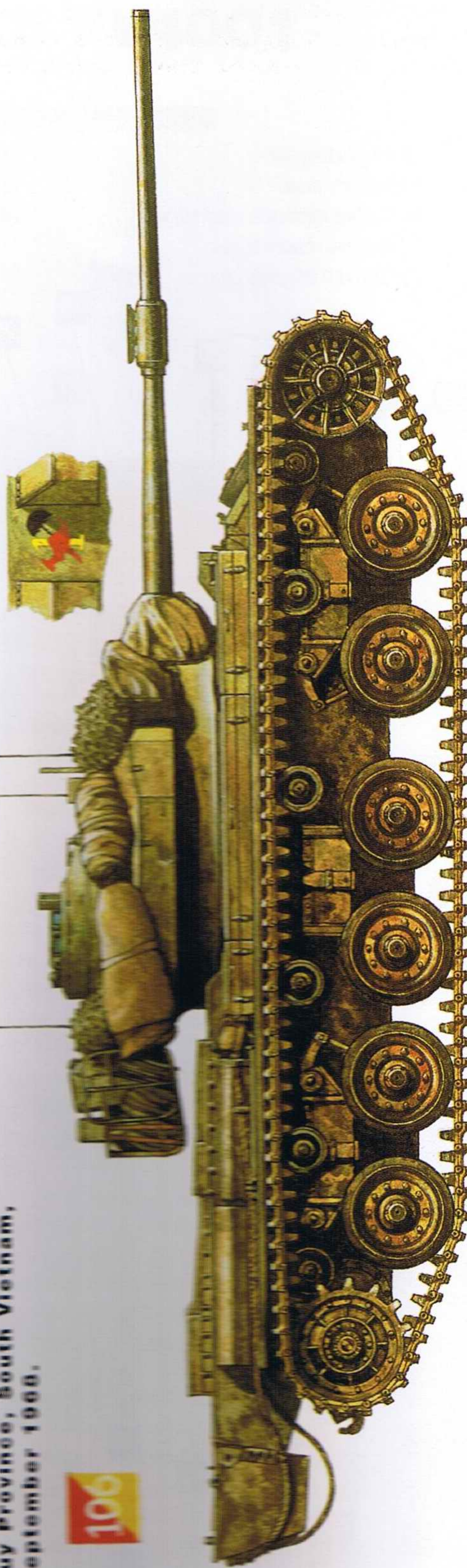


25

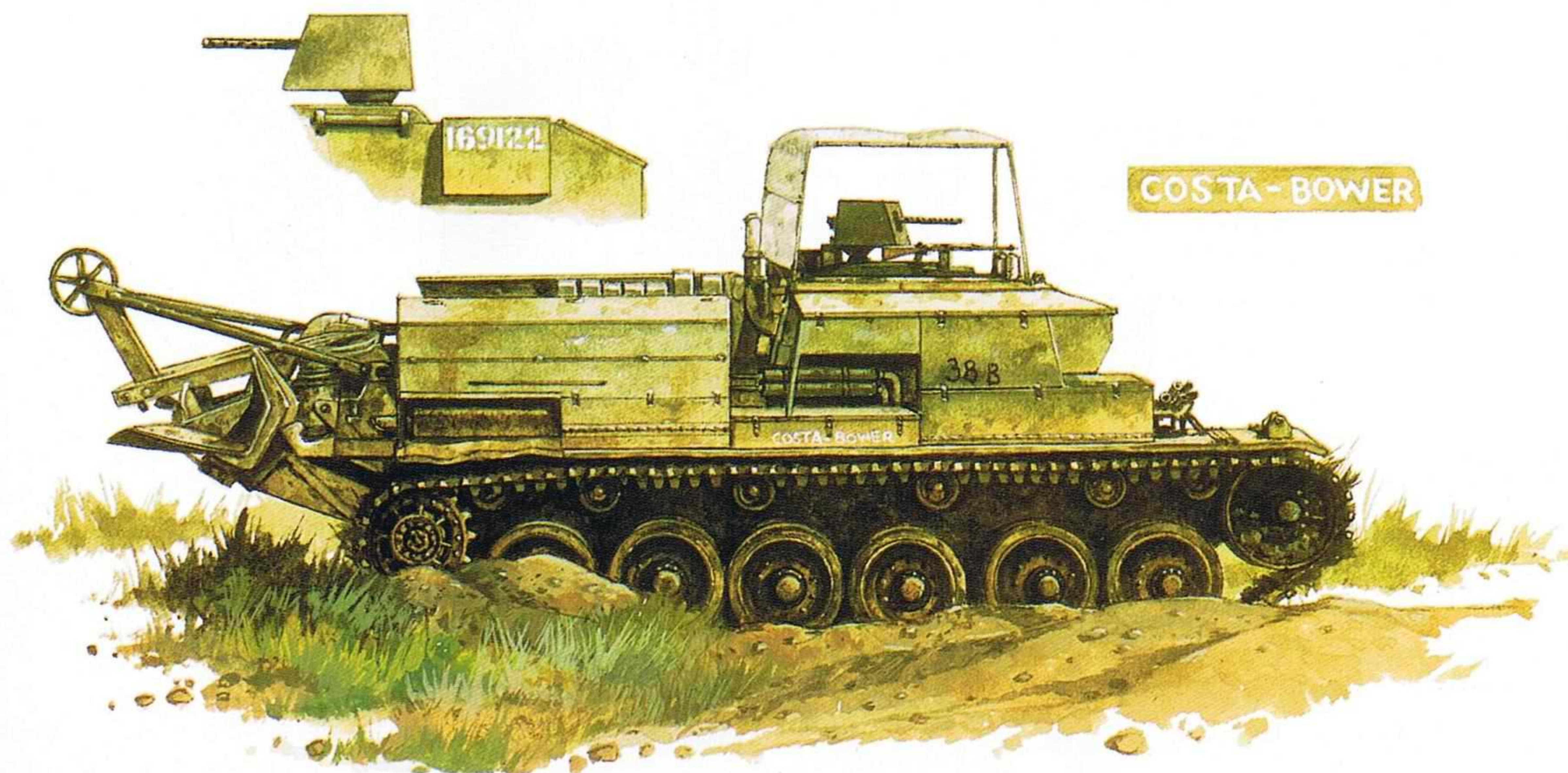


E2: Centurion Mark 5/1 (Aust), 1 Troop, C Squadron, 1st Armoured Regiment, Royal Australian Armoured Corps, commanded by Lieutenant Gerry McCormack, Long Dien, Phuoc Tuy Province, South Vietnam, September 1966.

106



F1: Centurion ARV Mark 2, C Squadron, 1st Armoured Regiment, Royal Australian Armoured Corps, commanded by Sergeant Peter de Jong RAEME, Fire Support Base Coral, Bien Hoa Province, South Vietnam, May 1968.



F2: Centurion Mark 5 AVRE, 26 Armoured Engineer Regiment, Operation Motorman, Creggan Estate, Londonderry, Northern Ireland, 31 July 1972.



**G: Centurion Mark 5 AVRE, 32 Armoured Engineer Regiment,
Operation Desert Sabre, Southern Iraq, February 1991.**



against complex optical instruments. It was also potentially superior to the latter because of its ability to provide important ballistic data such as trunnion tilt and crosswinds. The ranging gun itself was a modified 0.5-inch M2 Browning mounted coaxially in the mantlet. It fired three-round bursts of incendiary-tipped tracer ammunition, which ignited on hitting a hard object to indicate a target strike. The gunner observed the fall of the tracer rounds at the estimated range until they struck the target. He then transferred the range data to the chosen ammunition scale, be it HE or APDS, and the main armament was fired. At ranges above 1,000 yards, this system was faster than shell ranging but the ranging gun only had an effective range out to a mile. In its time, it was a simple and practical method of range estimation, though it required precise alignment with the main armament to be effective.

At the same time as the installation of the ranging gun, a thermal sleeve was fitted to the barrel of the L7 105mm gun to reduce the distortion of the main armament on firing so increasing accuracy at long ranges. The adding of the ranging gun to Centurion altered the vehicle designation and produced the final marks of the gun tanks. A standard Mark 6 with ranging gun changed to Mark 6/2; 9 to 9/2 and 10 to 10/2. Those tanks that had already fitted with IR equipment – Marks 6/1; 9/1 and 10/1 became Marks 11, 12 and 13 respectively. As a corollary, those Centurions Mark 6/2, 9/2 and 10/2 that were fitted with IR equipment also became Marks 11, 12 and 13. By now, a range of special-purpose variants based on the Centurion chassis that were designed to support the gun tanks on the battlefield was entering service.

A Centurion Mark 5 AVRE displays the tools of the armoured engineer with its 165mm demolition gun, fascine cradle and dozer blade.



CENTURION SPECIAL-PURPOSE VARIANTS

Following World War II, the A-series classification for tanks was changed to FV numbers; the FV standing for Fighting Vehicle. Thus the A45 Universal tank became the FV201 while the A41 Centurion was classified as the FV4000 series. As stated above, the FV201 Universal Tank and its family of special-purpose variants were cancelled in 1948 and 1949 respectively. The allocation of resources to the FV200 series delayed the design and development of special-purpose variants based on the Centurion chassis. The most pressing need was for a purpose-built Armoured Recovery Vehicle, or ARV, to support Centurion units. Experiences in Germany and Korea had shown that the wartime Churchill ARV Mark 2 was too slow and unreliable. As an interim measure, several Centurion gun tanks were modified into tugs by the removal of their turrets. As towing vehicles, they were effective but, because they lacked any form of winching equipment, they were unable to recover bogged tanks.

Centurion ARV Mark 1

To fulfil this requirement, the Centurion ARV Mark 1 was produced as a stopgap measure to meet an urgent operational requirement for a more powerful recovery vehicle in Korea (see Plate A2 for further details). Based on Centurion Mark 1 and 2 hulls, the turrets were replaced by a slab-sided superstructure housing a 72 brake horsepower Bedford QL truck engine to drive the winch. The vehicle was fitted with a spade at the rear in order to anchor itself during winching operations. In March 1952 the first models were rushed to Korea, where they equipped the REME

The Centurion Mark 5 Dozer provided a useful earth-moving capability within armoured formations with one issued per tank squadron. Tankdozers were exported to several foreign users of Centurions including Australia, which used them extensively during the Vietnam War.



Heavy Aid Detachment of the 5th Royal Inniskilling Dragoon Guards. Approximately 180 Centurion ARV Mark 1 vehicles were built. They were withdrawn from service in 1959 but remained as training vehicles well into the 1960s.

Centurion ARV Mark 2

The design of a purpose-built Centurion ARV began at the Fighting Vehicles Proving Establishment in 1951. The first prototype was completed on New Year's Eve 1952. It underwent trials from February 1953 until July 1954. Production began in 1955 at Vickers Armstrong and ROF Woolwich Arsenal and the Centurion ARV Mark 2 entered service with the British Army in 1956. The basis of the ARV Mark 2 was a Centurion Mark 1, 2 or 3 hull with an armoured superstructure in place of the turret housing a winch powered by an auxiliary engine. The winch was capable of producing a direct pull of 30 tons or up to 90 tons using pulley blocks carried on the glacis plate. In conjunction with the rear-mounted earth anchor, this allowed the ARV to recover even the most severely bogged tank. The ARV was able to recover lighter vehicles from the front and sides as well as push casualties by means of a wooden bumper bar at the front. The vehicle also carried numerous special tools and spares to undertake repairs in the field including oxyacetylene gas cylinders for welding and cutting. The vehicle

armament was a single .30-inch calibre Browning machine gun mounted on the commander's cupola. With a crew of four, the vehicle was manned by REME (Royal Electrical and Mechanical Engineers) personnel and four ARVs were attached to each armoured regiment of the Royal Armoured Corps with one for each tank squadron and one in regimental headquarters.

Centurion Bridgelayers and ARK

Rivers, gaps and man-made anti-tank ditches are a major impediment to the advance of armoured formations. To negotiate such obstacles, the British Army introduced various specialised vehicles based on the Centurion hull. The Centurion Bridgelayer was based on a Mark 5 chassis and carried a No 6 Tank

A Centurion Mark 5 Bridgelayer deploys its No 6 Tank Bridge during an exercise in West Germany in 1969. Centre decking sections are carried along the hull sides. They are placed between the trackways to allow all types of vehicles to cross the bridge.





The IDF procured its first Centurion in December 1958 in an order including 16 second-hand Mark 5s and 14 new build Mark 8s. These are some of the Mark 8s during one of the first public displays of the Centurion to the Israeli public at the 15th Independence Day celebrations. (IDF)

Bridge. Capable of launching in under two minutes, the bridge could span gaps up to 45 feet wide and bear vehicles up to 80 tons in weight. With the addition of centre decking sections laid between the trackways, the complete range of armoured and 'soft skin' vehicles in a battle group could cross the No 6 Tank Bridge. For gaps of greater width up to 75 feet, the Centurion ARK or Armoured Ramp Carrier was used with the vehicle itself entering the obstacle and acting as a central pier. The trackways could be either launched prior to entering or in the gap itself, depending on the nature of the banks. They could also be deployed over walls and earthworks to provide a means of crossing for gun tanks and other vehicles up to a maximum weight of 80 tons. Launching of the trackways was by means of a single hydraulic cylinder driven by the main engine. Both types of Bridgelayers entered service with the British Army in 1963 and the Royal Engineers (RE) employed them.

Centurion Armoured Vehicle Royal Engineers (AVRE)

As its name implies, the Centurion AVRE was also employed by the Royal Engineers. It was designed to undertake a number of roles on the battlefield in support of armoured formations. It mounted a 6.5-inch (165mm) low velocity demolition gun to destroy field fortifications, pillboxes and other strongpoints on the battlefield. The AVRE could carry a fascine bundle on a front-mounted cradle. This was dropped into streams, trenches and anti-tank ditches to aid the advance where the launching of a tank bridge was inappropriate. In addition, a roll of metal Class 60 Trackway could be carried to provide a stable platform for vehicles to negotiate boggy ground such as a bridge approach or river crossing point. The AVRE could tow a special RE 7.5-ton four-wheel trailer designed to carry a fascine; Class 60 Trackway roll; demolition stores or other equipment. Other trailers included mechanical minelayers and the Giant Viper rocket-propelled mine-clearing equipment. The AVRE was fitted with a hydraulically operated dozer

blade for clearance and denial; the creating or filling of anti-tank ditches; the preparation of river crossing places and bridge approaches; and digging gun emplacements and tank hull-down fire positions. The Centurion Mark 5 AVRE entered service in 1963 and it was the last Centurion vehicle to see combat with the British Army during the Gulf War of 1991 (see Plate G for more details).

Centurion Mark 5 Dozer

The Tank, Gun, Centurion Mark 5, Dozer was a standard Mark 5 gun tank fitted with a hydraulically operated dozer blade identical to that of the Centurion AVRE. Manufactured by Pearsons of Newcastle, the dozer blade incorporated a renewable steel cutting edge at the bottom and a hinged flap at the top. As the dozer blade filled with earth, the hinged flap rose into the driver's view giving an indication of blade load. A joystick in the driver's compartment controlled the dozer blade and the system had a comparable earth-moving capacity to the Caterpillar bulldozer. As an indication of its performance, the Centurion Dozer was able to dig a hull-down fire position in light soil in seven minutes. Because of the extra weight of the blade, the Centurion Dozer was not up-armoured on the glacis plate. It entered service with the Royal Armoured Corps in 1961 and was usually issued on a scale of one per tank squadron.

Centurion Beach Armoured Recovery Vehicle (BARV)

The primary role of the Beach Armoured Recovery Vehicle or BARV is to recover stranded tanks and landing craft during an amphibious assault. It is also used for many other general tasks during a beach landing such as laying Class 60 Trackway. The Centurion BARV is the last Centurion variant to see service with the British Army. Introduced in 1963, it will be superseded in 2003, after a remarkable career of 40 years, by a BARV known as Hippo based on a Leopard chassis. The design and development of the Centurion BARV began in 1957 at the REME Fording Trials establishment at Instow in north Devon. Final development was

A Centurion Beach Armoured Recovery Vehicle fulfils its primary role of retrieving a stranded Centurion gun tank fitted with deep wading equipment during an amphibious landing exercise. The BARV was the last Centurion variant to see service with the British Army.



undertaken at the Fighting Vehicles Research and Development Establishment (formerly FVPE) at Chertsey. The production of 12 Centurion BARVs was undertaken by the Royal Ordnance Factory Barnbow in Leeds and completed in 1963. The vehicle was able to wade to a maximum depth of nine and a half feet with a usual operating depth of up to eight feet. The BARV had a crew of four including driver, commander and two REME mechanics, one of whom was a qualified diver to attach towing cables to stranded vehicles under water. The Centurion BARV has seen extensive service with the British Army and Royal Marines, from the Middle East, with the Amphibious Warfare Squadron, to the Arctic, with the ACE Mobile Force Land in Norway. The two LPDs (Landing Platform Dock), HMS *Fearless* and HMS

Intrepid, carried one Centurion BARV each and they were deployed operationally during the Falklands War of 1982.

Conclusion

Despite the fears of the General Staff during World War II the Centurion proved to be highly adaptable to a host of different roles. Those shown above were the principal variants to see service but there were many more experimental models based on the Centurion chassis. During the early 1950s, two long-range tank destroyers, the FV4004 and FV4005, were designed to counter the threat of the Soviet JSIII. The FV4004 Conway mounted a 120mm gun in a tall slab-sided turret and one prototype was built. The FV4005 carried an even heavier 183mm gun on a limited traverse mounting with an automatic loader as the Self-Propelled Heavy Anti-Tank Gun No 1. Again only one prototype was built and the Conqueror heavy tank subsequently fulfilled the role. A range of self-propelled artillery vehicles based on the Centurion chassis was proposed but only the FV3802 and FV3805 mounting a 25-pounder gun and 5.5-inch howitzer respectively appeared as prototypes. During the 1950s and early 1960s, many experiments were conducted to equip Centurion gun tanks with wading and flotation kits to allow them to reach the shoreline after disembarking from tank landing ships during



The first major modification to Israeli Centurions was the fitting of the L7 105mm gun in place of the 20-pounder. It proved decisive during the stunning victory in the Sinai in the Six Day War of June 1967. Here, the crew of a Centurion Mark 5 make their final preparations just days before the outbreak of war. (IDF)

amphibious assaults. Several of the wading kits were accepted for service and were used operationally in the Middle East and during the landings at Suez in November 1956.

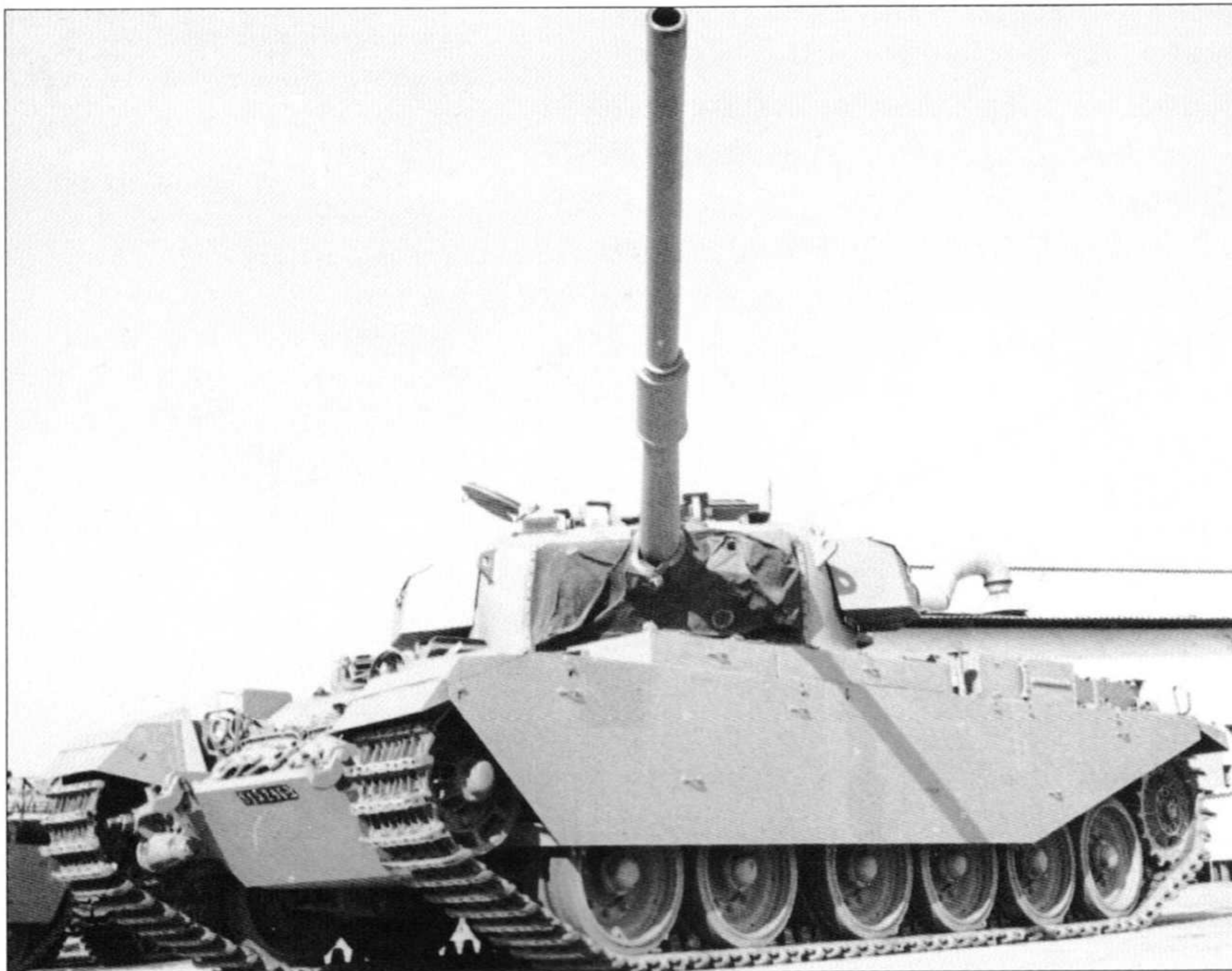
CENTURION UPGRADES

After its successful combat debut during the Korean War, the Centurion next saw action with the British Army at Suez during the abortive campaign to regain control of the Suez Canal following its nationalisation by Egypt in 1956. In both 1965 and 1971 the Centurions of the Indian army proved their worth in the costly and indecisive battles for the disputed territories of Jammu and Kashmir (see Colour plate E1). In 1968 the Australian Army increased its commitment to the Vietnam War with the deployment of Centurion tanks of the 1st Armoured Regiment (see Colour Plates E2 and F1). Despite the appalling terrain, the tanks proved to be a valuable addition to the offensive strength of the 1st Australian Task Force over the next three years before their withdrawal in 1972. In the Middle East, the Centurions of the Royal Jordanian Army fought a bitter battle in September 1970 when the 40th Armoured Brigade destroyed numerous T-54/55 tanks during a Syrian invasion in support of the Palestine Liberation Organisation.

Although the Centurions of the Israeli Armoured Corps proved highly successful during the Six Day War of 1967, the IDF had recognised several limitations of the tank. In particular, the ageing Meteor petrol engines and the inadequate combat range for desert warfare were significant problems that had to be rectified. The first priority was to find a suitable replacement engine. The operational requirement demanded that it had to be readily available on the world market; be of reasonable cost; provide the specified performance; be suitable for local conversion, and fulfil the

ease of maintenance needs. All three engines that were tested proved satisfactory but they did require a modified rear hull to accommodate the larger powerpack. Finally, the Teledyne Continental AVD-S-1790-2A air-cooled diesel engine was selected, as it was also suitable for the M48A2 Pattons that were being upgraded at the same time. The powerpack incorporated an Allison CD-850-6 automatic transmission that greatly eased the task of driving over long distances and simplified driver training. Together with many other detail changes, the new

Even before the Six Day War, the Israeli began a comprehensive improvement programme for the Centurion at the Israeli Ordnance Corps workshops at Tel a Shomer that emerged as the Upgraded Centurion or SHO'T – the Hebrew for 'whip'. (IDF)



powerpack provided greater range; a higher top speed; and, being diesel, reduced the fire risk, which increased 'crew survivability'. This factor was of great significance to the Israelis as many tank crews suffered grievous wounds from burns when petrol-engine tanks often caught fire after being hit in combat.

In all, the comprehensive improvement programme for the Centurion took some three years. To mark its entry into service in May 1970, the Israeli Ordnance Corps re-designated the vehicle as the Upgraded Centurion, but tank crews called it the SHO'T – Hebrew for 'whip'. By now, all the Centurions within the Israeli Armoured Corps had been fitted with the L7 105mm gun with improved ammunition stowage and an increased load of 72 rounds. All these factors were to be crucial during the opening days of the Yom Kippur War, which erupted on 6 October 1973 with simultaneous invasions by the Egyptian and Syrian armies. On the northern front defending the Golan Heights, the Israelis deployed 177 Upgraded Centurions manned by the elite 7th Armoured and 188th Barak Brigades. Both these regular formations fought a critical battle to stem the armoured onslaught of some 1,200 Syrian tanks, including hundreds of the formidable T-62 with its powerful 125mm main armament. For 48 hours, the ever-decreasing number of SHO'Ts fought the Syrians to a standstill as the Israelis desperately dispatched reservists and their tanks to the defence of the Golan Heights as soon as they were mobilised. After 51 hours of almost continuous battle, the Syrians began to withdraw leaving 500 knocked-out tanks and a similar number of other AFVs on the battlefield. It is no exaggeration to say that the 177 Centurions of the 7th and 188th Brigades saved the state of Israel from catastrophe.

After the Yom Kippur War, with the frightening number of casualties among Israeli tank crews, the development of the indigenously designed Merkava Main Battle Tank (MBT) was accelerated with the main emphasis on 'crew survivability'. Many of the casualties were caused by the widespread use of wire-guided anti-tank missiles and Rocket Propelled Grenades (RPG). Urgent measures were taken to develop greater protection against the specific threat of High Explosive Anti-Tank (HEAT) weapons. In the late 1970s, the Upgraded Centurions and M60 MAGACH

A SHO'T manoeuvres at high speed under the covering fire of a companion vehicle in a hull-down position during the fierce fighting on the Golan Heights in the opening days of the Yom Kippur War of October 1973. (IDF)





The SHO'T was also used extensively on the Sinai front and was among the first tanks to cross the Suez Canal during the Israeli counteroffensive. This SHO'T displays the extensively modified engine compartment of the Upgraded Centurion with its characteristic air filter boxes on the rear trackguards. (IDF)

MBTs were fitted with revolutionary supplementary armour known as Blazer. Consisting of a series of individual blocks, explosive reactive armour, or ERA, disrupts the armour-piercing properties of HEAT weapons and prevents penetration of the tank's main armour shell. Tanks fitted with ERA were first used operationally during the Israeli incursion into Lebanon in 1982 where it proved highly effective against attack by Sagger missiles and RPGs, even at point blank range.

As the Merkava entered service in greater numbers, the SHO'T was progressively withdrawn from frontline duty. Some of the redundant gun tanks were then converted into heavy armoured personnel carriers (APC) following the loss of numerous lightly armoured M113 APCs in the close-quarter fighting experienced in southern Lebanon. The original requirement was put forward by the IDF Engineering Corps to provide greater protection for combat engineers in their dangerous tasks. Designated as the Puma, the combat engineer APC first appeared in 1984. It was followed by further models based on an Upgraded Centurion chassis including the NAGMASHO'T, NAKPADON and NAGMACHON. All these feature extensive armour arrays of both passive special armour of the Chobham variety and ERA. The vehicles are armed with a range of machine guns, mortars and an instantaneous smoke-screening system. Over 700 Centurion variants remain in service with the IDF and it is likely that they will do so for several years to come.

During the late 1960s and early 1970s, several of the armies in Europe equipped with Centurions devised upgrade programmes similar to that of the Israelis, with the obsolescent Meteor engines being replaced by a new diesel powerpack and improvements to the fire control system. Although they all proved successful, none came to fruition and more modern main battle tanks such as the Leopard 1 superseded the Centurions. However, there were countries that were subject to an international arms embargo, such as the Republic of South Africa. It had to draw on its own resources to procure modern weapons systems. The South African army acquired the first of 200 Centurion Mark

3s in 1952. These were then modified to become Mark 5s with the substitution of the 7.92mm Besa coaxial machine gun by the .30 calibre Browning. In 1972 an improvement programme codenamed Skokiaan saw the replacement of the Meteor/Merritt-Brown combination with an 810 horsepower fuel-injected petrol engine and a three-speed automatic transmission, but only eight conversions were undertaken. Together with another 27 Centurions, these eight were further modified with a new powerpack in 1974 to become the Centurion Mark 5A or the Semel. This model was tested operationally during the protracted counter-insurgency campaign in South West Africa, later Namibia.

Two years later, a major upgrade programme was undertaken that led to the Semel being renamed the Olifant – elephant in Afrikaans. Featuring the same powerpack as the Semel, the Olifant entered service in 1978. The Olifant Mark 1A followed in 1985 with a new diesel powerpack developing 750 horsepower coupled to a semi-automatic transmission, the L7 105mm gun as the main armament and a mounting for a searchlight above the gun barrel. Further development continued and the definitive model, the Mark 1B, appeared in 1991. In fact, the Olifant Mark 1B was a comprehensive rebuild from the ground up with a completely new suspension system of torsion bars housed inside a revised double floor hull. Yet another new powerpack was fitted to the Mark 1B, a V-12 diesel engine of 950 horsepower coupled to a new AMTRA automatic transmission with four forward and two reverse gears. Automotively, the Mark 1B has a higher top speed and much improved reliability as compared to earlier models and the new suspension provides superior cross-country ability and crew comfort.

The firepower of the Olifant Mark 1B is much enhanced by a computerised fire control system with an integral laser rangefinder in the gunner's day/night sight. The commander has a similar sight and the remainder of the crew have improved vision devices at each of their stations. The L7 105mm gun is fitted with a thermal sleeve to increase accuracy of the main armament at long ranges. A total of 68 105mm rounds can be stowed inside the tank and it is further armed with two 7.62mm machine guns as well as eight 81mm smoke grenade launchers. While the mobility and firepower of the Mark 1B have been



The Olifant has seen combat service in South West Africa and Angola as a counter to the T-54, T-34 and PT-76 tanks used by the SWAPO and FAPLA forces and their Cuban comrades. Here, the Olifants of F Squadron from the School of Armour line up prior to Operation Hooper against the FAPLA 21st Brigade in late 1987.

much improved, protection has also been considerably increased with the addition of special passive armour panels on the glacis plate and turret including the roof. The turret incorporates new enlarged stowage bins at the rear; tank crews soon discovered that the largest one could be used as a bath. This has been proved to be beneficial for hygiene in the hot climate and the stowage bin now incorporates a specially designed drain plug for this purpose. The bazooka plates have also been redesigned to allow easier access to the suspension and reduce dust clouds being thrown up by the tracks during operations in the bush. With all these improvements, the Olifant Mark 1B weighs 58 tons with a maximum speed of 36mph; a great improvement over the 21mph of the original Centurion.

Fifty years after they were manufactured, the South African Centurions in their new guise as Olifants became the most powerful MBT in Sub-Saharan Africa. The South African army retains a fleet of 224 Olifant gun tanks, as well as a number of special-purpose variants. A new turret designated Olifant 2 has been developed that features a state-of-the-art hunter/killer-type fire control system comparable in performance to the M1A2 Abrams. The Olifant 2 can also mount an LIW 105mm GT-8 rifled gun or a 120mm smooth bore gun as main armament. This turret can be placed in production quickly should the need arise and be fitted to existing Olifant hulls to create a formidable and cost-effective MBT for the 21st Century. Few weapon systems have had such longevity in frontline service as the Centurion. It is a remarkable tribute to the British designers that a tank conceived in 1943 should still be in frontline service in the year 2003.

After almost 60 years of continuous service, the Centurion remains a potent and formidable gun tank in the guise of the Olifant Mark 1B - the culmination of a truly classic AFV that has fought with distinction across the globe from the icy mountains of Korea to the sweltering jungles of Vietnam and from the arid deserts of the Middle East to the dusty bush warfare of southern Africa. The Centurion was indeed a universal tank that has proved to be one of the most outstanding tank designs of all time.





A1: Centurion Mark 1, B Squadron, 1st Royal Tank Regiment, Detmold, Germany, 1947.

The Centurion entered service with the British Army in December 1946. One of the first units to receive the tank was 1st Royal Tank Regiment, known at the time as the 'Prime Panzers'. The vehicle is painted Deep Bronze Green and carries the famous red jerboa of the 7th Armoured Division. On the left of the glacis plate is the Royal Armoured Corps arm-of-service flash surmounted by a white bar with the legend 'I R Tks' (the correct abbreviation of 1st Royal Tank Regiment) superimposed in black. The name 'Mechile' on the turret sides indicates a Centurion of B Squadron, as their tanks were named after regimental battles of the North African campaign and Italy. A Squadron tanks displayed those of A Battalion during the Great War while C Squadron named theirs after battles in northwest Europe. Shipping instructions are painted on the right front track guard indicating the port of destination – Hamburg; the manifest number FSO 9925/3 and, on the side of the track guard stowage bins, the directive 'NOT TO BE STOWED ON DECK'. Other markings include the vehicle registration number T351822 on the top right of the glacis plate below which is stencilled THIS VEHICLE IS FILLED WITH ANTI-FREEZE 1.8.46. & MUST NOT BE DRAINED'.

A2: Centurion ARV Mark 1, C Squadron, 1st Royal Tank Regiment, commanded by Sergeant T. George RNZAC, Gloster Valley, Korea, 1953.

The pressing need for a more powerful armoured recovery vehicle in Korea than the Churchill ARV Mark 2 prompted the production of a stopgap design pending the introduction of a purpose-built vehicle. Based on the hulls of redundant Centurions Mark 1 and 2, the ARV Mark 1 proved to be an effective machine. The ARV is painted overall Deep Bronze Green and carries on the side stowage bin the C Squadron sign in red, outlined in white for greater clarity. Commanded by Sergeant George, on attachment from the Royal New Zealand Armoured Corps, the crew have advertised their trade with the slogan 'You Call – We Haul' on the gun planks stowed on the front superstructure. Markings include the

The commander of a Centurion Mark 6/1 (LR) fires his .30-inch calibre Browning machine gun during a firing exercise on the ranges in West Germany during 1968. Mark 6/1 denotes the tank is equipped with infrared night fighting equipment – the 22-inch searchlight is visible stowed in the rear turret basket. The suffix LR stands for Long Range after the fitting of a 100-gallon armoured fuel tank to the rear hull plate.

insignia of 1st British Commonwealth Division on the right front trackguard, with the Royal Electrical and Mechanical Engineers (REME) flash and unit serial on the left.

B: Centurion Mark 3, C Squadron, 8th King's Royal Irish Hussars, commanded by Captain George Strachan MC, Yongdungpo, Korea, 11 February 1951.

The first Centurion to fire a shot in anger was 'Caughoo', an early production Centurion Mark 3 belonging to C Squadron HQ Troop, 8 KRIH and commanded by Capt. George Strachan MC. As befitted a famous cavalry regiment, the names of 8th Hussars tanks in Korea were equestrian in nature. A (traditionally known in the KRIH as R) and C Squadrons named theirs after hunts, hunters and hounds; e.g. 'Alycidon', 'Aly Sloper', 'April Fool', 'Berkeley', 'Bosun', 'Boxer', 'Colorado', 'Cameronian' and 'Colonist'. The names of Regimental HQ vehicles began with the letter H, e.g. 'Humorist', 'Halcyon' and 'Hurry On' – the traditional name of the regimental commander's tank. During the initial mobile phase of the Korean War, all Allied vehicles displayed prominent white stars – the recognition sign of the United Nations Forces. In 1948 a civilian-type plate bearing numerals and letters superseded the wartime 'T' number registration system for tanks. The registration number of 'Caughoo' is 02ZR58, carried on the rear hull plate, and on a black strip on the turret sides and lower front hull. The vehicle callsign, SA within a circle, denotes the second tank of C Squadron HQ Troop. It is displayed on a black metal plate on the centre bazooka plate and turret rear. The loose metal

plates were often lost in action and 'Caughoo' lacked one on the other side. On the left front track guard (as viewed) is the RAC flash with the unit serial '41' superimposed in black, while on the right is the 'frozen orifice' formation sign of 29th Infantry Brigade, a white ring on a black square. The tank is liberally stowed with tarpaulins, bed rolls and crew comforts to ward off the bitter cold of the Korean winter, as well as water jerrycans, rimless RAC helmets and discarded ammunition boxes as extra stowage bins. The generous allocation of American stores made these essential items. On the cooling air deflector beneath the rear hull plate is the black and white convoy distance marker, common to all Centurions.

C: Centurion Mark 5 of 10 Troop, 'C' Squadron, 4th Royal Tank Regiment, commanded by Sgt. 'Jake' Jacobs, West Berlin, 22 August 1961.

This Centurion Mark 5 with a 20-pounder A Type barrel is shown on the Bismarckstrasse in West Berlin during an alert following the sealing of the Soviet sector behind the Berlin Wall. C Squadron of 4th Royal Tank Regiment provided armoured support to the Berlin Independent Infantry Brigade Group. The colour scheme of overall US Olive Drab is peculiar to British military vehicles in Berlin during this period. On the left front trackguard is the bridging classification sign. Below the registration number on the lower front hull is the Union Flag common to all British vehicles in BAOR, distinguishing them from other NATO nations. The unit insignia and formation insignia of the Berlin Brigade appear either side of the registration plate 05BA46. The vehicle name 'DIEHARD' is painted on the sides of the trackguard stowage bins; tank names in 4RTR have traditionally begun with the fourth letter of the alphabet. Another tradition is the 'Chinese eye' painted on the forward face of the turret stowage bins. It first appeared during the World War I on a Tank Mark IV of F Battalion, which was paid for by a Chinese businessman. Later it was carried by tanks of 4th Battalion, Royal Tank Corps and subsequently by all tanks of 4RTR. Other markings include the C Squadron tactical sign in white and the vehicle callsign, a plain white '2', on the black-painted

jerrycan at turret rear. All of them were kept in immaculate condition, with such details as black-painted mantlet cover and alternate red/white striped radio aerials.

D: Centurion Mark 5 FV4001

E1: Centurion Mark 7 of Maj. Gen. Rajinder Singh, GOC Indian 1st Armoured Division, North Punjab, September 1965.

This Centurion Mark 7 was the tank of Major General 'Sparrow' Rajinder Singh, General Officer Commanding 1st Armoured Division in the Sialkot battles during the Indo-Pakistani War of September 1965. The vehicle registration number KX261 appears on the lower front hull and trackguard stowage bins. The trumpeting elephant insignia of 1st Armoured Division is borne on the front right trackguard. On the opposite side trackguard is the black square of Divisional HQ with the serial '25' in white. These insignia are repeated on the rear hull plate just above the level of the towing pintle. The elephant appears immediately to its left, '25' immediately to its right; immediately right of this is '^ KX/261' in two lines on a black background. Between the headlights and on each turret side is the vehicle name 'Ankush'. This is the Urdu word for an elephant goad carried by a mahout to guide and encourage his charge, an appropriate name for a command tank. It was customary for only command tanks to display such names whilst regimental commanders named their tanks after battle honours. The pale yellow solid circle air recognition sign on the turret roof enlivens the overall drab green colour scheme.

E2: Centurion Mark 5/1 (Aust), 1 Troop, C Squadron, 1st Armoured Regiment, Royal Australian Armoured Corps, commanded by Lieutenant Gerry McCormack, Long Dien, Phuoc Tuy Province, South Vietnam, September 1968.

In 1967, the Centurions destined for deployment to Vietnam were modified at the 3rd Base Workshops, Bandiana, with the addition of supplementary armour on the glacis plate, a 50 calibre Browning ranging gun, infrared night fighting



A Centurion Mark 6/2 pauses during an exercise in West Germany during the winter of 1969. The Mark 6/2 incorporated a 0.50-inch ranging gun; visible between the coaxial machine gun and the 105mm main armament.



The final model of Centurion that began as a Mark 3 was the Mark 11. It featured all the progressive improvements that were applied to the Centurion gun tank during its many years of service with the British Army including up-armouring; up-gunning; night fighting equipment; ranging gun; and an auxiliary fuel tank for increased operational range. These Centurions belong to the 4th Canadian Mechanised Brigade Group during an exercise in West Germany in 1966.



The SHO'T remains in service with the Israeli Army in a much modified form as a heavily armoured personnel carrier for infantry and specialised troops such as combat engineers. These two vehicles are the NAGMACHON infantry carrier variant with explosive reactive armour blocks that provide protection against RPG attack. The NAGMACHON is also fitted with the Israeli Military Industries CL-3030 instantaneous self-screening system. (Marsh Gelbart)

equipment and a 100-gallon armoured fuel tank on the rear hull plate. Designated Centurion Mark 5/1 (Aust) for Australian, four troops of gun tanks were deployed to South Vietnam in February 1968. The vehicle callsign '31' is prominently displayed on the rear fuel tank and transmission decks. The numbers were clearly visible to an airborne observer guiding the tanks through difficult terrain. Denoting 1st Troop Leader of C Squadron, the callsign is repeated on a black metal plate attached centrally to the turret rear stowage basket. The registration number 169049 is painted in white on the rear fuel tank and top right of the glacis plate. Below the registration number is the arm-of-service flash of the Royal Australian Armoured Corps with the unit serial '106' superimposed in white. The flash is repeated on the top left of the glacis plate. Between the turret stowage bins is painted the insignia of 1 Troop – a yellow numeral '1' beneath a red leaping kangaroo surmounted by a black umbrella. The red kangaroo was initially painted on all 1st Australian Task Force but the South Vietnamese had never seen a kangaroo and no word for the animal in their language so the Australians were nicknamed the 'Red Rats'. The addition of the umbrella reflected the troop leader's penchant for directing his tanks in battle while wielding his umbrella.



A Centurion Mark 3 of B Squadron, 8th King's Royal Irish Hussars, takes up a defensive position to cover the withdrawal of United Nation forces near the North Korean capital of Pyongyang in December 1950 following the Chinese intervention into the Korean War. (US Army)

F1: Centurion ARV Mark 2, C Squadron, 1st Armoured Regiment, Royal Australian Armoured Corps, commanded by Sergeant Peter de Jong RAEME, Fire Support Base Coral, Bien Hoa Province, South Vietnam, May 1968.

Of all the specialised vehicles based on the Centurion, none was more important than the armoured recovery vehicle intended to retrieve disabled tanks from the frontline. In Vietnam, few tank operations were conducted without the support of an ARV and its companion M113A1 Fitter's Track. Manned by personnel of the Royal Australian Electrical and Mechanical Engineers (RAEME), the Centurion ARV Mark 2 was constantly in action both in the assault and for the recovery of vehicle casualties bogged in the mire of the Vietnamese countryside. Each tank squadron in Vietnam had the support of two ARVs rather than the one in peacetime operations. Soon after arrival in Vietnam, armoured extensions were welded to the rear stowage bins to provide protection from small arms fire for combat engineers and tracker-dog teams who sometimes rode on the rear engine decks. A gun shield was also fitted to the commander's cupola mounted machine gun. The base colour of olive drab



With their elderly Centurion ARVs and AVREs, the armoured engineers in the Gulf War were known as the Antiques Road Show. Soon after the victory, the AVREs began the grisly task of clearing the Kuwait-Basra highway and Mutla Pass of the detritus of war in a major operation codenamed Motorman II. This name was chosen as one of the AVREs had been in the original route clearance operation in Londonderry in 1972. (MOD)

is masked beneath the red dust characteristic of much of Vietnam. Markings are limited to the vehicle registration number 169122 at front and rear; the vehicle name 'COSTA BOWER' and the callsign '38B'. The initial number denotes C Squadron; '8' the recovery section and Bravo the ARV. '38A' was the callsign of the M113A1 Fitters Track. '38B' is applied freehand on each side of the vehicle in subdued black so denying an aiming point to enemy RPG gunners. The vehicle name, painted freehand in neat white capital letters on the sides of the trackguard stowage bins, is Gaelic for 'Death Carriage', a mythical contraption driven by a headless horseman. Over the crew compartment is a nylon shade giving protection against sun and rain.

F2: Centurion Mark 5 AVRE, 26 Armoured Engineer Regiment, Operation Motorman, Creggan Estate, Londonderry, Northern Ireland, 31 July 1972.

Operation Motorman was the largest operation conducted by the British Army since Suez in 1956. The object of the operation was to restore control in those areas of Ulster that were dominated by extremists of the nationalist movement, especially in the Creggan and Bogside estates of Londonderry and the Andersonstown and Ballymurphy areas of Belfast. At 0400 hours on 31 July 1972, four Centurion AVREs, their turrets traversed to the rear and their demolition guns shrouded beneath tarpaulins, entered the so-called No-Go area around the Rossville Flats and Creggan Estate in Londonderry. The AVREs were required to demolish the formidable barricades that had been



The SHO'T variant used by Israeli armoured engineers is known as the PUMA and it entered service with the IDF following the significant losses of combat engineers during the Lebanon campaign of 1982. The vehicle is heavily protected against all types of infantry weapons with passive armour panels and armed with three 7.62mm machine guns including the RAFAEL Overhead Weapon System, which can be fired remotely from under armour. The PUMA can be fitted with front-mounted mine-clearing devices such as rollers or ploughs as well as the Carpet fuel air explosive minefield breaching system which is propelled by rocket from a rear-mounted hamper or separate trailer. (Marsh Gelbart)

erected to exclude the security forces. As it was believed that the barricades were booby-trapped with explosives, only an AVRE had sufficient armour protection against such a threat. In the event, the barricades were quickly dismantled without difficulty and the AVREs were soon withdrawn from the operation for fear of appearing provocative. The AVRE is finished in the standard British Army disruptive camouflage pattern of matt black stripes over a base colour of flat green. The vehicle registration number 09BA64 appears on the rear hull and in a single line at the top right of the glacis plate. There is little doubt as to the identity of the users of the Centurion AVRE as the bazooka plates testify. Below the Corps title is a decal of the ship's crest of HMS *Fearless*. The LPD HMS *Fearless* transported the AVREs to and from Ulster for Operation Motorman and the ship's crew zapped the vehicles before they landed in Londonderry.

G: Centurion Mark 5 AVRE, 32 Armoured Engineer Regiment, Operation Desert Sabre, Southern Iraq, February 1991.

The Centurion last saw action with the British Army during the Gulf War in 1991. As part of Operation Granby, two Centurion variants, the AVRE and ARV, were dispatched to the Gulf with the Royal Engineers; 40 years to the month since the Centurion's first operational deployment in the Korean War. The Centurions were employed by the engineer squadrons of 21 and 23 Engineer Regiments and 32 Armoured Engineer Regiment. Each of the armoured brigades within 1st (BR) Armoured Division were supported by an engineer regiment – 23 Engineer Regiment with 4th Armoured Brigade and 21 Engineer Regiment with 7th Armoured Brigade. 32 Armoured Engineer Regiment remained a divisional asset as the Route Development Battle Group. The regiment included 31 and 77 Armoured Engineer Squadrons. Each squadron consisted of three troops, each equipped with two Centurion AVREs, two Chieftain Bridge-layers and two Combat Engineer Tractors. Their role was to assault and breach the Iraqi main defensive lines. In the event, the breach was quickly completed and armoured engineer assistance was not needed. During the actual hostilities, the regiment's principal task was to develop and protect a main supply route for wheeled logistic vehicles supporting the advance. EASY POSSE is the second AVRE in 1 Troop of 77 Armoured Engineer Squadron. The name EASY POSSE appears on the first two Chobham armour panels and the vehicle callsign on the third. The inverted 'Vee' is the mutual recognition sign of the coalition forces. On the rear bazooka plate is the vehicle zap code 4/3/B indicating the unit and its higher formation.

At the top right on the hinged flap of the dozer blade and on the side of the fume extractor is the famous Bull's Head insignia of the World War II 79th Armoured Division that was adopted by 32 Armoured Engineer Regiment. For its intended use in the assault, the Centurion AVRE was extensively up-armoured with Chobham armour panels from the Warrior Infantry Fighting Vehicle along the vehicle sides protecting the crew compartment and ERA blocks protecting the turret. On the glacis plate is an appliqué armour panel and a MIMIC – Magnetic Influence Mine Induction Coil. This device was intended to disrupt the fuses of magnetic mines before the vehicle passed over them.

Figures in **bold** refer to illustrations

ammunition

APDS (Armour Piercing Discarding Sabot)

8, 10

Centurion Mark 3 12, 13

armament

.30-inch calibre Browning machine guns 35, 42, **44**

.50-inch calibre Browning machine guns **19**

.50-inch ranging guns **45**

2-inch Bombthrowers Mark 2 13, 21

7.62mm Browning guns 21-2, **D**

17-pounder guns 4, 5, 8

20mm Polsten cannon 4, 6, 7, 8

20-pounder guns 8-9, **8, 11, 12, 13, 45, C, D**

Besa machine guns 5, 8, 12, 42

fire control systems 10-11, 12-13, 42, 43

L7 105mm guns 10, **21, 23-4, 33, 38, 40, 42**

armour

Blazer 41

Chobham armour panels 47, **G**

explosive reactive armour (ERA) 41, **46**

glacis plates 4, 24

on Olifants 43

skirting plates 14

armoured personnel carriers 41, **46, 47**

Armoured Ramp Carriers, Centurion ARK **24, 36**

Armoured Recovery Vehicles (ARVs)

Centurion ARV Mark 1 34-5, 44, **A2**

Centurion ARV Mark 2 **22, 35, 46-7, F1**

Churchill ARV Mark 2 34

Armoured Vehicles Royal Engineers (AVREs)

33, 36-7, 46, 47, F2, G

PUMA **47**

Australia, use of Centurions 34, 39, 45-7, **E2, F1**

Beach Armoured Recovery Vehicles (BARVs)

37-8, **37**

bridgelayers **24, 35-6, 35**

British Army: subunits

1st Commonwealth Division 17

1st Royal Tank Regiment 20, 44

4th Royal Tank Regiment 45

5th Royal Iniskilling Dragoon Guards 8, 17-20, **18, 35**

5th Royal Tank Regiment 8

6th Royal Tank Regiment 19

8th King's Royal Irish Hussars **14, 15, 16-17, 17, 44-5, 46**

16th/5th The Queen's Royal Lancers **21**

1st, 23rd, 26th and 32nd Armoured

Engineer Regiments 47

29th British Independent Brigade 16, 17

Duke of Wellington's Regiment 20

Royal Australian Regiment **14**

camouflage **12, 18, 47, F2**

Centurions **3, 23**

in cold conditions 16

comparison to Panthers 5

handling 12, 16

overseas users 22

technical description 11-15

Centurions: models

Mark 1 5-8, **5, 44, A1**

Mark 2 **7, 8-9**

Mark 3 **8, 9, 9, 10, 10, 11-15, 11, 12, 14, 15, 16-20, 16, 17, 18, 42, 44-5, 46, B**

Mark 5 **13, 19, 22, 24, 38, 42, 45, C, D**

Mark 5/1 (Aust) 45-6, **E2**

Mark 5A (Semel) 42

Marks 6, 6/1 and 6/2 **21, 24, 33, 44, 45**

Mark 7 **20, 22, 24, 45, E1**

Mark 8 **24, 36**

Marks 9, 9/1 and 9/2 24, 33

Marks 10, 10/1 and 10/2 **21, 24, 33**

Mark 11 **33, 45**

Mark 12 33

Mark 13 33

Olifants 42-3, **42, 43**

prototypes 4, 5-8

special-purpose variants 34-9, 41

Upgraded (SHO'Ts) 39-41, **39, 40, 41, 46, 47**

Cottle, Captain **15**

Danish Army **19**

dozers see tankdozers

driving controls 11

engines 6, 13-14, 39, 41, 42, **D**

equipment 11-14, 45, **B, D**

infrared night fighting equipment 24, **44**

Magnetic Influence Mine Induction Coil (MIMIC) 47, **G**

periscopes 11, 12

radios 13

ranging guns 24-33

searchlights 19, 24

smoke grenades 13

stowage bins **7, 11, 43**

Falklands War (1982) 38

Fighting Vehicles Proving Establishment (later Fighting Vehicles Research and Development Establishment) 8, 35, 38

fuel 14, 22, 44, **D**

gearboxes 6, 14

generators 7, 14

Gulf War (1991) 37, **46, 47, G**

The Hook, action at (1953) 20

Imjin River, battle of the (1951) 17

India, use of Centurions 39, 45, **E1**

infantry carriers, NAGMACHON **46**

Israel, use of Centurions 22-3, **23, 36, 38, 39-41, 39, 40, 41, 46, 47**

Jordan, use of Centurions 39

Korean War (1950-53) **14, 15-20, 15, 16, 17, 18, 34-35, 44-45, 46, A2, B**

Libya, tank deployment in **12**

MacArthur, Gen. Douglas 15

maintenance 13

manufacture **7, 10, 15**

NATO 21, 22, 24

North Africa, World War II operations 3-4

Northern Ireland, operations in (1972) 47, **F2**

O'Daniel, Maj. Gen. John 17

Operation Armadillo's Delight (1964) **21**

Operation Commando (1951) 17

Operation Desert Sabre (1991) 47, **G**

Operation Hooper (1987) **42**

Operation Motorman (1972) 47, **F2**

Operation Sentry 8

Radfan campaign (1964) **21**

range 14, 20, 22, 44, **D**

registration systems 44, **B**

Royal Ordnance Factory Barnbow, Leeds 10, 15, 38

Six Day War (1967) 23, **38**

South Africa, use of Centurions 41-43

South West Africa, operations in 42, **42**

speed 15, 44, **D**

steering 12

Suez Canal crisis (1956) **19, 39**

suspension systems 7, 14, 42

Tal, Gen. Israel 23

tank destroyers 4, 10, 38

tankdozers **34, 37**

tanks

A41 and A41A Heavy Cruiser 4, 5-8

A45 Universal Tank (FV201) 6, 9

AMX-13 22

Challengers 8

Churchills 5

Comets 6

Cromwells 5, 6, 8, 16

Cruisers 3-4

FV214 Conqueror Heavy Tank 6, 10

Infantry 3, 4

Josef Stalin III 9-10

Leopard 1 41

M4 Sherman 4, 6, 15, 22

M24 Chaffee light 15

M26 Pershing 15

M48 Patton 23, 39

M103 Heavy Tank 10

Matilda Infantry Mark II 4

Merkavas 40-1

Panthers 4, 5

T-34 15

T-54 23, 39

see also Centurions

transmission 14, 39, 42, **D**

turrets

A41A Heavy Cruiser 7-8

Centurion Mark 2 **6, 7**

Centurion Mark 3 11, 12

Olifants 43

United States, use of Centurions 22

Vickers Armstrong factory, Elswick 10, 15, 35

Vietnam War (1954-75) 39, 45-7, **E2, F1**

West Germany, operations in 9, 44, **44, 45, 45, A1, C**

Woolwich Arsenal 7, 8, 35

World War II 3-5

Yom Kippur War (1973) 40, **40**

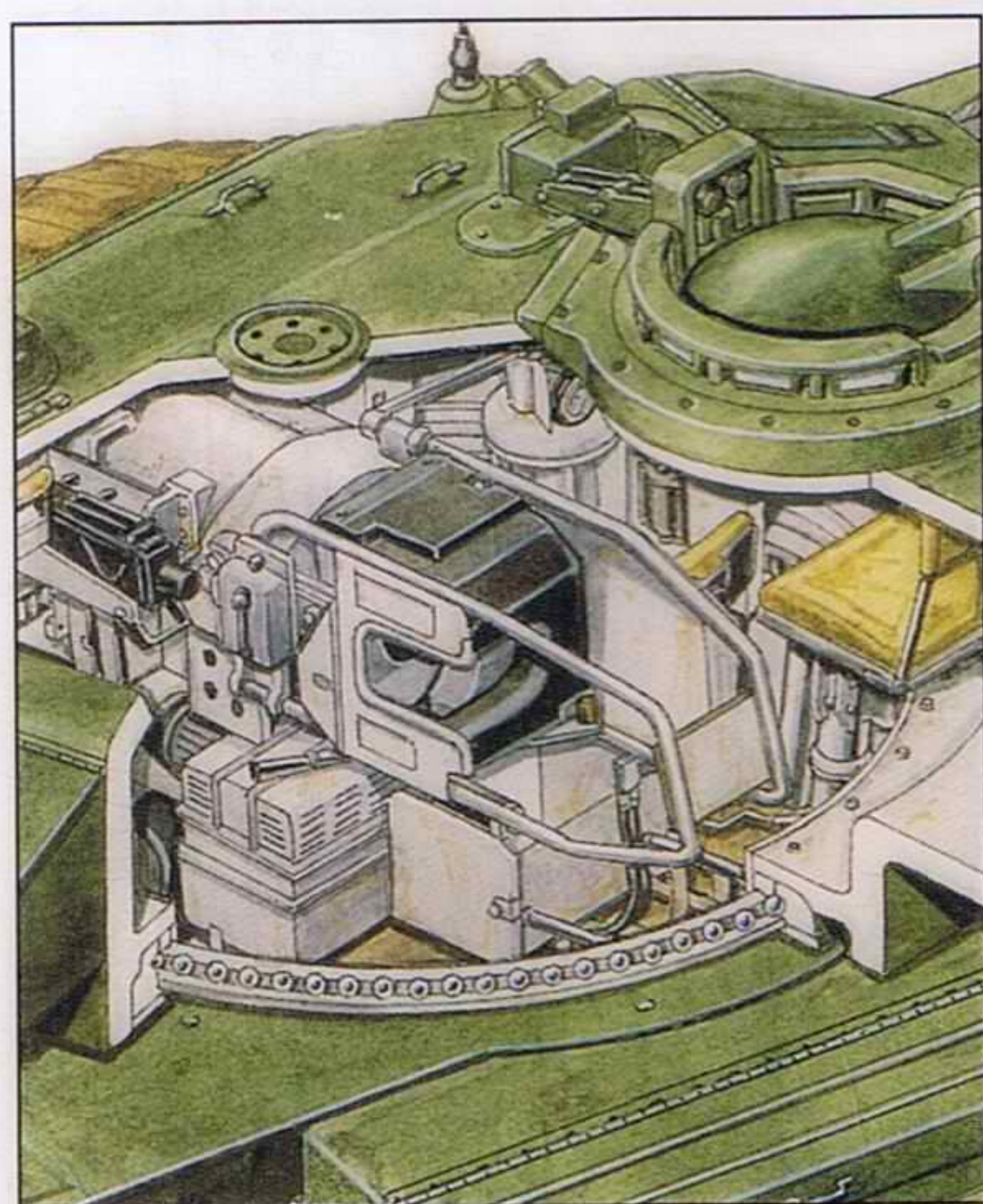
The design, development, operation and history of the machinery of warfare through the ages.



Full colour artwork



Unrivalled detail



Cutaway artwork



Photographs

Centurion Universal Tank 1943–2003

From 1943 the British began work on a new tank that bore distinct similarities to the German Pzkw V Panther. This design emerged in mid-1945 as the Centurion, just too late to see action in World War II. It has remained in service with the British Army in various guises ever since, and was last used in action in 1991 during the Gulf War. It has also seen combat with the Israeli Defence Forces, the Indian Army and the Australian Army in Vietnam. This book details all the marks of Centurion used from World War II through the Korean War to the present day, as well as covering the many specialised variants – some of which are still in use.